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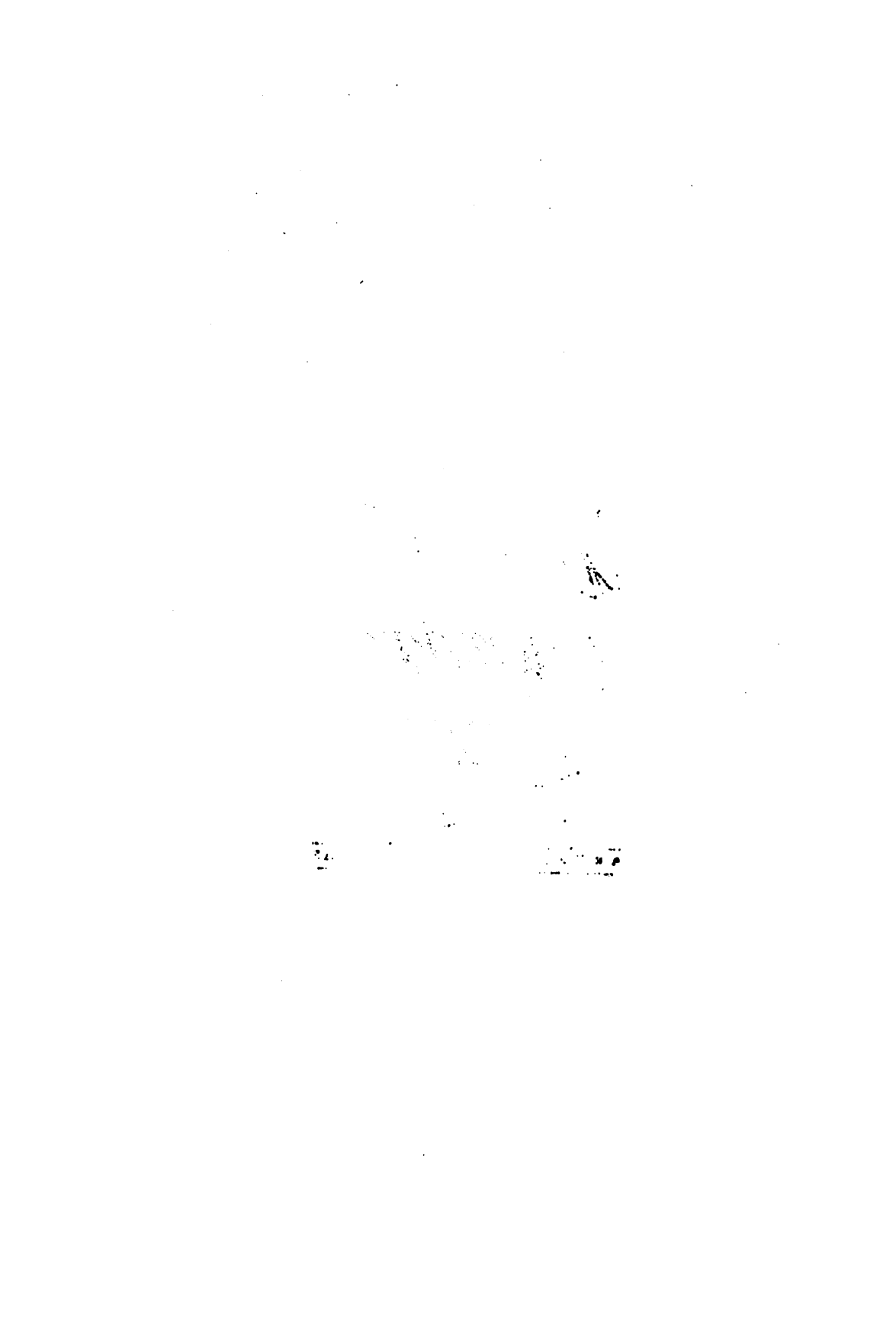
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# ANNUAL REPORT

OF THE

# CANAL COMMISSIONERS

OF THE

STATE OF NEW YORK.

FOR THE FISCAL YEAR ENDING SEPT. 30, 1871.

GEORGE W. CHAPMAN,  
WILLIAM W. WRIGHT,  
JOHN D. FAY, } *Canal Commissioners.*

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TRANSMITTED TO THE LEGISLATURE JANUARY 26, 1872.

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STATE OF NEW YORK.

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No. 29.

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IN ASSEMBLY,

January 20, 1872.

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ANNUAL REPORT  
OF THE CANAL COMMISSIONERS.

STATE OF NEW YORK:

CANAL COMMISSIONERS' OFFICE, }  
ALBANY, December 30, 1871. }

*To the Honorable the Legislature of the State of New York :*

The undersigned herewith transmit their respective reports as Canal Commissioners, for the fiscal year ending the 30th day of September, 1871.

Very respectfully,

WILLIAM W. WRIGHT,  
JOHN D. FAY,  
GEORGE W. CHAPMAN,

*Canal Commissioners.*

# ANNUAL REPORT.

## STATE OF NEW YORK:

CANAL COMMISSIONERS' OFFICE, }  
ALBANY, *December 30th*, 1871. }

*To the Honorable the Legislature of the State of New York:*

The Canal Commissioners, in charge of the canals of this State, respectfully submit their

## ANNUAL REPORT

for the fiscal year ending September 30th, 1871:

The Board of Canal Commissioners, on the 1st day of January, 1871, consisted of John D. Fay, William W. Wright and George W. Chapman.

It was organized by the election of William W. Wright, President, and George W. Chapman, Secretary.

To George W. Chapman was assigned, in special charge, the Eastern Division of the canals, which is made up as follows:

### ERIE CANAL, EASTERN DIVISION.

	Miles.	Miles.
Albany to east bank of Oneida Lake canal.....	133.58	
Albany basin (1 mile for tolls, Laws of 1849).....	.77	
Port Schuyler and West Troy side cuts.....	.35	
	<hr/>	134.70
Champlain canal and Waterford side cut.....	66.00	
Pond above Troy dam.....	3.00	
Glen's Falls feeder and pond above.....	12.00	
	<hr/>	81.00
Black River canal.....	35.33	
Black River feeder and pond above dam.....	12.09	
Delta feeder.....	1.38	
Black River improvement.....	42.50	
	<hr/>	91.30
	<hr/>	
Total.....		307.00
		<hr/>

To William W. Wright was assigned, in special charge, the Middle Division of the canals, which embraces the following:

	Miles.
Erie canal, from the East bank of the Oneida Lake canal to the county line between Seneca and Wayne counties, including the several feeders and reservoirs.....	76
Chenango canal, feeders and reservoirs.....	97
Chenango Canal extension, now under contract for construction,	30
Oswego canal.....	38
Oneida Lake canal.....	7
Oneida River improvement.....	20
Seneca River towing-path.....	5 $\frac{1}{2}$
Cayuga and Seneca canal.....	23
Cayuga inlet.....	2
Crooked Lake canal.....	8
Chemung canal.....	23
Chemung Canal feeder.....	16
Seneca River improvement.....	12 $\frac{1}{2}$
Total.....	358

To John D. Fay was assigned, in special charge, the Western Division of canals.

The canals embraced in this division are as follows:

	Miles.
Erie canal, from the east line of Wayne county to Buffalo, including works connected therewith.....	149
Genesee Valley canal from Rochester to Olean.....	107
Extension of said canal from Olean to Millgrove.....	6
Dansville branch, from Shakers to Dansville.....	11
Total.....	273

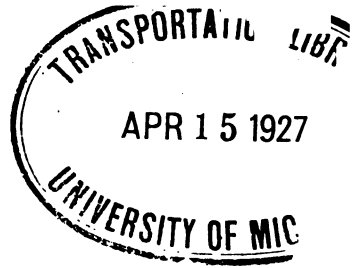
*Summary.*

	Miles.
Eastern Division.....	307.00
Middle Division.....	358.00
Western Division.....	273.00
Total.....	938.00

The Champlain canal was opened on the 17th, and the other canals of the State on the 24th day of April, 1871, and were closed by ice on the 1st day of December.

Under previous appointment, Nathan Ackley has continued to act as clerk of the Board of Canal Commissioners during the fiscal year.

GEORGE W. CHAPMAN,  
WILLIAM W. WRIGHT,  
JOHN D. FAY,  
*Canal Commissioners.*



## EASTERN DIVISION.

### REPORT OF GEORGE W. CHAPMAN, CANAL COMMISSIONER.

The Commissioner in charge of the Eastern Division of the New York State canals respectfully presents his annual report for the fiscal year ending on the 30th of September, 1871.

The Eastern Division comprises that portion of the Erie canal extending from the south end of the Albany basin to the east bank of the Oneida Lake canal at Higginsville, nine miles west of Rome, including also the Champlain canal, extending from Troy to Whitehall and the Black River canal and improvement, extending from Rome to Carthage, together with all feeders, dams, side cuts and reservoirs connected therewith, its aggregate length being three hundred and seven miles. This division is divided into eleven superintendent or repair sections; the Erie canal into five, and the Champlain and Black River canals each into three.

The following named superintendents of repairs were placed in charge of these sections by appointment of the Canal Board, February 1st, 1871:

Section One, Erie canal.....	William J. Wheeler.
Section Two, Erie canal.....	Benj'n. Van Vranken.
Section Three, Erie canal.....	Daniel S. Read.
Section Four, Erie canal.....	Daniel M. Golden.
Section Five, Erie canal.....	Charles Graham.
Section One, Champlain canal.....	George W. Neilson.
Section Two, Champlain canal.....	George Satterlee.
Section Three, Champlain canal.....	George Northup.
Section One, Black River canal.....	John Cole.
Section Two, Black River canal.....	R. Sanford Miller.
Section Three, Black River canal.....	Frank B. Johnson.

By appointment of the Board of Canal Commissioners, George L. Ames has acted as division agent, or general superintendent, during the fiscal year.

The engineering department of this division has been under the charge of E. H. Crocker, division engineer, Peter Hogan, resident engineer, Wm. B. Cooper, S. E. Babcock and G. M. Barnes, assistant engineers.

To each and every one of the officers above named, great credit is due for their faithful and efficient discharge of their duties, in the repairing and improvements of the canals, and the maintenance of good navigation during the seasons of 1870 and 1871.

Upon ten of the eleven sections of the Eastern Division the ordinary repairs and management have been under the charge of the superintendents during the whole of the fiscal year. Section one, Erie canal, has been under contract for repairs which expires January 1st, 1872.

The following is a detailed statement of the objects and amounts of all expenditures on the Eastern Division for the different sections during the fiscal year, from September 30th, 1870 to September 30th, 1871, showing all the amounts which have been paid or certified to be due, which are classified as follows:

- I. For ordinary repairs, payable from the revenues of the canal.
  1. By superintendent of repairs.
  2. By drafts on Auditor.
  3. By Canal Commissioner from miscellaneous account.
  4. By certificates, on estimates due, or on awards of Canal Board.
- II. For extraordinary repairs, for which appropriations are made by law, and for which taxes are levied.
  1. By drafts on Auditor.
  2. By Commissioner from miscellaneous accounts.
  3. By certificates on estimates due, or awards of Canal Board.
- III. For awards and expenses of awards before the Canal Appraisers.
  1. By draft on Auditor.
  2. By certificate.
  3. By Commissioners for expenses of trials and awards from miscellaneous account.

Together with statements of the condition of the canals, and works and improvements connected therewith, the improvements and repairs made during the past fiscal year or contemplated to be made, and recommendations of such measures in relation to the canals as he shall deem the public interest to require.

## ERIE CANAL.

## SECTION No. 1.

WILLIAM J. WHEELER, *Superintendent.*

This section still remains under contract for repairs, made with William C. Stephens (assigned to Thomas Gale) for five years from January 1, 1867, and extends from the south end of Albany basin to the west end of the lower Mohawk aqueduct, including the West Troy and Port Schuyler side-cuts; the Champlain canal, from the junction to a point 200 feet north of the guard lock at Cohoes, on the south side of the Mohawk river; the Troy dam, the sloop lock and the pond above, making nineteen miles.

The structures upon this section are:

Forty-three locks; 182 lock gates; two weigh-locks; two collectors' and weigh-offices; one aqueduct (lower Mohawk); six waste-weirs; sixteen culverts; fourteen farm bridges (wood); six road bridges (wood); eighteen road bridges (iron); three tow-path bridges (iron); two tow-path bridges (wood); two foot bridges (wood); eight lock houses; eighteen watch houses; one workshop at Cohoes; two timber sheds; one dwelling-house at State yard, Cohoes.

The following is a statement of work done as ordinary repairs by repair contractors: The locks were generally repaired in the spring, and put in order for navigation.

There has been thirty-four new lock gates built, of which twenty gates have been put in the following locks:

Lock number 3.....	Two gates.
Lock number 4.....	Two gates.
Lock number 5.....	Three gates.
Lock number 9.....	Two gates.
Lock number 10.....	Two gates.
Lock number 11.....	Three gates.
Lock number 12.....	One gate.
Lock number 13.....	Two gates.
Lock number 14.....	Two gates.
Lock number 15.....	One gate.

Many of the old gates have been repaired by putting in new heel or toe posts, new arms, new balance beams, and fender planks.

All the bridges on the section have been painted except three covered bridges on the Erie and two old wood bridges on the Champlain canals, the iron bridges with a black composition paint, and the wood bridges with white lead and linseed oil.

The bridges through West Troy and Cohoes, which are most in use, have been replanked lengthwise of the bridge, and the approaches have been graveled up and made easy for teams to pass.

The culvert heading from the Albany weigh-lock has been extensively repaired; the culvert on the Champlain canal above the junction, also those at Port Schuyler and West Troy have been opened. Further repairs are needed upon the culvert of the West Troy weigh-lock.

The lower Mohawk aqueduct has been repaired by supporting one section of the trunk on the towing-path side, which was considered unsafe, and by work on the stone coping.

The channel from the West Troy and Port Schuyler side-cuts have been thoroughly dredged, so that no detention has occurred in consequence of low water in the river.

The Albany basin has been dredged, so as to give in all the channels necessary for use of basin, and for navigation, seven feet of water at low tide.

The old piles under the Columbia street bridge have been taken out, and a good channel made.

The prism of the canal has been cleaned out, and the side walls repaired where needed throughout the length of the section.

The tow-path through the sixteen locks was graveled and graded, so as to be dry and smooth at all times of the season.

The protection walls at the Harmony Mills in Cohoes have been repaired, and the ditches along the towing-path to carry off the leakage water have been opened.

A covered stone drain made along the Lansing farm near lock No. 18.

The north end of the pier at the sloop lock at Troy was undermined, and the filling washed out, which has been filled up with stone and gravel, and sheet piling driven outside of the docking. The gravel which naturally works into the lock has been thoroughly cleaned out. The new gates put in last year work well.

The weigh-locks at Albany and West Troy have been put in good order, and the scales adjusted. The collector's and weigh-masters offices were extensively repaired last spring.

The Mohawk basin at West Troy has been cleared of all old wrecks, so as to make a good harbor, and the channel opened to the dam above.

The boat A. D. Hoyt, loaded with salt, sunk July 20th, at lock No. 8, no fault of the contractors or superintendents.

Ten patrolmen were employed from October 1st, to the close of navigation 1870. During the year 1871 no patrolmen were appointed. Further assistance has been rendered during the summer of 1871, by the superintendent, at an expense, including all other miscellaneous expenditures by superintendent, of ..... \$248 21  
 Superintendent's salary..... 1,000 00  
\$1,248 21

I would recommend that iron needle beams be inserted in all iron bridges on this section.

New bridges will be needed next year at the following places: Dunlop's bridge on the Troy and Albany level. J. D. F. Lansing's farm bridge near the paper mill on Nine Mile level. Alexander's bridge on the Champlain canal, and bridge below State yard.

New sides should be put in the trunk of the lower Mohawk aqueduct.

All locks (except such as have been concreted), should have the bottoms concreted. This was not thought necessary in their original construction, but many of them leak badly, and there is no other way to make them tight and safe.

The side-cut locks at Port Schuyler and West Troy require new miter sills.

The sloop lock at Troy should have the pier extended at the south end about fifty feet, to protect boats passing in and out of the lock.

The work shop and timber sheds at the State yard, at Cohoes, should be rebuilt or repaired.

The combined wooden locks on the Champlain canal, at Cohoes, should be rebuilt before the opening of navigation next spring.

The locks have been well and properly attended, and no detention to navigation has occurred.

The new stone dam at Cohoes, over the Mohawk river, completed this fall at the termination of section No. 1 Erie, is upon section No. 1 Champlain; but the accounts for this work, as originally opened and continued, in the auditor's office, have been charged to No. 1 Erie for the last three years. The extraordinary appropriation was expended in 1869, and the whole amount this year is all chargeable to ordinary repairs, which enhances the cost of this section for the past two years to a considerable amount.

A portion of the apron was carried away by a freshet in , but the whole work of the dam and apron is now complete. It is a



very permanent structure, and will not be likely to require any further expenditures for many years to come.

During the past fiscal year the following work has been done under extraordinary repairs :

The wing wall of the west abutment of the White street bridge in Cohoes has been lengthened out to protect the embankment for the sidewalk.

Some materials were delivered and stone cut for the West Troy side-cut locks, but the appropriation for the same lapsed in the spring of 1871, for want of reappropriation, and the work was stopped.

One new iron tow-path and road bridge (Whipple plan) has been built at Cohoes falls, near lock 18.

A new bulk-head and sluiceway around the guard lock on the south side of the Mohawk river at Cohoes.

A vertical wall, laid in cement, about 200 feet in length, at the south end of the lower Mohawk aqueduct on the berme side of the canal.

Under the contract for removing wall bench and constructing slope and vertical wall from Port Schuyler side-cut to lower Mohawk aqueduct, the old slope wall and benches have been removed and vertical wall inserted in place of same, the line straightened and improved on the following levels on this section, to wit :

From lock 3 to lock 4 about.....	2,400 feet.
From lock 4 to lock 5 about.....	2,350 feet.
From lock 11 to lock 12 about.....	260 feet.
From lock 12 to lock 13 about.....	1,300 feet.
From lock 13 to lock 14 about.....	1,850 feet.
From lock 14 to lock 15 about.....	1,050 feet.
From lock 15 to lock 16 about.....	1,600 feet.
From lock 16 to lock 17 about.....	1,700 feet.
From lock 17 to lock 18 about.....	2,000 feet.

Total lineal feet of wall.....	14,510 feet.
--------------------------------	--------------

Further appropriations will be necessary to complete this work, which has already been of great benefit to the navigation upon this section.

The following statement shows the total expenditures of all kinds upon the section for the fiscal year :

The undersigned, in charge of the eastern division, and as secretary of the Board of Canal Commissioners, pays for certain expenditures of the Board of Canal Commissioners, and of the canals of the whole State, such as printing, advertising in State paper, stationery, clerk

hire, and office expenses of all kind at Albany, etc., and also for all miscellaneous expenses for the eastern division of every kind, such as printing, advertising, stationery, engineering, and expenses of Albany division engineers, and other offices, commissioners' salary, mileage, postage, telegrams, express, etc., etc.

These expenses, which are large in the aggregate, are not strictly chargeable to any particular section, although they are for the benefit of all. It was formerly the custom to apportion them arbitrarily to the different sections, but of late years, for convenience of keeping accounts, these expenses are all charged to section one, Erie canal, which makes the miscellaneous expenditures of that section seem much larger than that of any other section in the State.

All the items of the expenditures may be found detailed in the division engineers' report, and in the Auditors' annual financial report.

The expenditures for the fiscal year, upon section 1, Erie canal, were as follows:

#### I. ORDINARY REPAIRS.

##### 1. *Superintendent's Expenditures.*

Salary .....	\$1,000 00
Assisting navigation and expenses.....	248 21
	<hr/>

##### 2. *Drafts on Auditor.*

Repair contract.....	\$64,760 67
Dredging .....	62,232 50
Stone dam at Cohoes.....	69,009 00
Commissioners' salary.....	2,000 00
Drafts for engineering, chargeable to ordinary repairs, Eastern Division.....	8,000 00
	<hr/>

##### 3. *Miscellaneous Expenditures by Commissioner.*

Salaries, printing, postage, stationery, express, telegrams, expenses Commissioners' offices, and general miscellaneous expenses for the Eastern Division.....	\$8,939 98
Commissioners' mileage (one year).....	400 00
	<hr/>

## II. EXTRAORDINARY REPAIRS.

*Drafts on Auditor.*

Wall bench from Port Schuyler to L. M. aqueduct....	\$99,943 00
Wall bench from Port Schuyler to Lock No. 2, revision of final account by Canal Board .....	958 60
Repairs to State dam at Troy .....	3,791 18
West Troy side-cut locks, upper lock .....	884 00
lower lock .....	3,451 00
Iron bridge at Cohoes .....	2,262 71
Iron bridge at lower Mohawk aqueduct .....	1,452 82
Iron change bridge at lock 18 .....	4,807 20
Deepening channel of and constructing waste-weir at Dry river, West Troy .....	5,404 86
Sluice around Cohoes guard lock .....	4,274 86

*Miscellaneous.*

Lengthening abutment of White street bridge, Cohoes	586 48
Engineering, for work on the section and Albany office, printing, advertising, express, telegrams, and expenses of division engineer's office .....	12,291 75
	<u>\$140,108 46</u>

## III. AWARDS AND EXPENSES OF AWARDS.

Counsel fees in claim cases .....	\$1,534 50
Certificates for awards of Canal Appraisers .....	10,315 89

## SECTION No. 2.

BENJAMIN VAN VRANKEN, *Superintendent.*

Extends from the west end of the lower Mohawk aqueduct to the head of lock No. 27, a distance of thirty-two miles.

The structures on this section are:

Eighteen locks; one guard lock; seventy-four lock-gates; three aqueducts; two waste-weirs; nineteen culverts; twenty-one road bridges (wood); three road bridges (iron); eighteen farm bridges (wood); two change bridges (wood); one tow-path bridge (wood); one swing-bridge (wood); seven lock-houses; one work shop and timber shed; nine watch houses; one dam across Mohawk river at upper Mohawk aqueduct.

The annexed table shows all the work of ordinary repairs done on the section by the superintendent during the fiscal year.

The locks have been put and kept in thorough repair; seven new

bulk-heads have been constructed, and the others repaired; new mitre-sills, bumping beams and valves have been inserted where needed.

The bottom and apron of lock 19, has been planked, and the bottom of culvert at lock 27, new timbered and planked.

The repairs to lock-gates have been thoroughly made; four new gates, eleven balance beams and twenty-eight valves inserted, with general repairs upon all the gates.

Four new gates have been constructed, which with those on hand fitted to particular locks, make ample provision for accidents to lock-gates.

The expense of lock tending has been considerably increased by the large amount of business, done on the Erie canal during the past season.

New sides have been put in Hoffman's aqueduct, and the piers repaired; new sides and valves and coping relaid at Van Slyck's, and new braces added and ice-breakers repaired at upper Mohawk aqueduct.

The bottom of Van Epps' culvert, was found to be undermining, piles were driven at the lower end, the planking taken up and the space under the timbers puddled with gravel, and the structure made secure.

The side wall of Planter's Hill culvert has been repaired, and temporary repairs made at Crescent culvert.

A new wood and change bridge has been built at lock 22; new farm bridges at Newton's, Felter's, Van Vranken's, Schermerhorn's and Fowler's, and new foot bridges at locks 23, 24 and 25.

Nineteen road bridges, sixteen farm bridges, one change and one draw-bridge have been repaired, and all the approaches to the bridges on the section, except those in the city of Schenectady, raised and graveled.

Repairs to railings and abutments have been made where necessary.

The workshop and shed at Rexford's Flats has been thoroughly repaired, and a temporary timber shed built in Schenectady.

The tow-path on nearly the entire section has been raised and graveled, and in many places widened, and protected by rip-rap wall along the river.

Competent and reliable watchmen have been employed day and night, during the season of navigation on all the dangerous embankments, thereby preventing any breaks on this section.

October 22d, 1870.—Boat Durango, loaded with barley, sunk on seven mile level. Navigation detained twelve hours; was unloaded and raised at an expense of \$596.33 which was refunded.

May 26th, 1871.—Boat Joe Drury, loaded with wheat, sunk on half mile level. Navigation detained four hours.

June 26th, 1871.—Boat Wm. Thurston, loaded with wheat, sunk on four mile level, no detention to navigation, was partially unloaded and raised at an expense of \$277.32 which was refunded.

At least seven feet depth of water has been maintained on all the levels on this section the past season, and no delays have occurred to navigation, except those noted above.

A guard bank should be built, commencing at Phillips' lock (26), three feet higher than the present tow-path at that point and running out at tow-path grade, one mile east, to prevent water from the Mohawk river flowing over tow-path into canal during spring freshets.

The culvert at Crescent, for about seventy feet under prism of canal, should be taken up and relaid before the opening of navigation in the spring. It was with difficulty maintained the past season.

The waste-weir above lock 20, three mile level, is in an unsafe and dilapidated condition and should be rebuilt.

There is still remaining on this section a portion of the old wall bench, which should be removed to give additional width of prism.

A vertical wall should be built on the berme side of canal, between Front and Fonda streets, in the city of Schenectady, to facilitate the unloading of boats at that point.

New road bridges should be built at John White's; Clute's dry dock and public road; farm bridges at Fowler's and John Pearce's; the road bridge at Becker's, four mile level, should have new chords and needle beams; the farm bridges at Turnbull's, John Vedder's, McMabee's and Cunningham's, should have new chords and be thoroughly overhauled.

Under extraordinary repairs the commissioner has completed the work of removing the old wall bench, and constructing slope wall and pavement from lock 20, west, to a point one mile above the upper Mohawk aqueduct, inserted an additional bulk-head with gates in that feeder, and put this portion of the canal in complete order.

Considerable progress has been made in the similar work under contract, east of lock 20, to the lower Mohawk aqueduct. When this necessary work is completed, navigation east of Schenectady will be very much improved. A new iron bridge has been built at Fonda street, Schenectady.

## EXPENDITURES, SECTION No. 2.

## I. ORDINARY REPAIRS.

1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....	\$592 50	\$1,409 41	\$2,001 91
Lock tending.....		9,794 94	9,794 94
Oil for locks .....		98 06	98 06
Lock-gates .....	1,066 49	2,582 13	3,648 62
Aqueducts .....	276 13	502 11	778 24
Waste-weirs.....		70 25	70 25
Culverts .....		669 17	669 17
Bridges of all kinds, inclu- ding abutments and ap- proaches.....	1,856 25	2,295 39	4,151 64
Scows and ice-breakers....		172 65	172 65
Ditches.....		64 00	64 00
Lock-houses.....		520 63	520 63
Workshop .....		446 82	446 82
Watch houses .....		5 32	5 32
Stopping leaks .....		267 50	267 50
Timber shed .....	128 14		128 14
Raising and repairing tow- path and berme bank....	6,334 04	3,578 17	9,912 21
Cleaning out prism of canal .....		4,390 97	4,390 97
Cleaning out creeks .....	772 70	168 50	941 20
Slope wall .....		137 50	137 50
Docking.....		192 10	192 10
Watching canal.....		1,302 73	1,302 73
Snubbing posts.....	228 50		228 50
Miscellaneous expenditures .....		1,137 86	1,137 86
	<hr/>	<hr/>	<hr/>
	\$11,254 75	\$29,806 21	\$41,060 96
Clerk hire .....			900 00
Superintendent's salary.....			1,200 00
			<hr/>
			\$43,160 96
 2. <i>Miscellaneous expenditures:</i>			
Repairs to dredge.....			345 82
			<hr/>
			\$43,506 78

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor:*

Wall bench, etc., from lock 20 to lower Mohawk aque- duct .....	\$9,724 00
Iron bridge, Fonda street, Schenectady .....	2,306 50

2. *Miscellaneous expenditures:*

Removing wall bench, etc., from lock 20 to a point one mile above upper Mohawk aqueduct.....	\$3,750 67
Engineering and advertising.....	2,372 00
	<hr/>
	\$18,153 17
	<hr/>

## III. AWARDS OF CANAL APPRAISERS, AND EXPENSES.

Drafts on Auditor .....	\$919 00
Miscellaneous — water survey at Rexford Flats.....	84 40
	<hr/>
	\$1,003 40
	<hr/>

## SECTION 3.

DANIEL S. READ, *Superintendent.*

Extends from the head of lock No. 27 (three miles east of Amsterdam), west to the foot of lock No. 34, and is thirty-seven miles in length.

The structures on this section are fourteen lift locks; three guard locks; seventy lock gates; ten aqueducts; twenty-nine culverts; five waste-weirs; thirty-one farm bridges; eighteen road bridges (wood); six road bridges (iron); one new suspension bridge at Fort Plain; two dams; two workshops; three dock houses.

This section was under charge of James Shanahan, as superintendent, up to February 15th, 1871, who was succeeded by Daniel S. Read, superintendent. The structures built and repaired since that date are as follows:

An entire new bottom has been constructed at lock No. 28, and slight repairs made to other locks on the section.

Twelve new lock gates have been constructed and inserted at locks 32 and 33; eight gates at lock 28 have been entirely new planked, and the rods, valves, and planking of gates at 29, 30, and 31, have been thoroughly overhauled and repaired.

The wood trunks at Yatesville, Lasher's, Spraker's, Canajoharie, and Fort Plain aqueducts, have been rebuilt, and repairs made to Schoharie creek aqueduct.

Temporary repairs have been made to Philips waste-weir on lower five mile level.

Sparks, Yankee Hill, and Mitchell's culverts were cleaned out in the fall of 1870. A new stone culvert has been constructed at Yankee Hill, on two and a half mile level, and Downing and Mitchell's culverts on fourteen mile level repaired.

A new stone abutment has been built at Quackenbush's farm bridge, and new farm bridges have been constructed east of Canajoharie aqueduct, over Schoharie feeder, and at Vosburgh's, Miles, Yate's, Winne's, Hawm's and Diefendorf's. Nellis farm bridge has been repaired and painted. A. J. Yates, Downing's, Lasher, Burns, Pitman's, Van Alstine's, Fort Hunter, Fort Plain, and Poor-house, Smith and Powers farm bridges, have been repaired, and the entire wood portion of the Canajoharie iron road bridge has been removed and new inserted in its place.

The towing-path on the five mile level has been raised nearly its entire length one foot, and the towing-path on five and two and a half, one, fourteen, six, five and three mile levels, thoroughly graveled.

The prism of the canal on the entire section has been thoroughly cleaned out. The cost of cleaning out creek channels is large on this section. Chuctawanda, Auriesville, Spraker's and Canajoharie creek channels were cleaned out in the fall of 1870. The creek channel leading from the culvert at Port Jackson on five mile level, and Lasher's aqueduct on fourteen mile level, have been thoroughly cleaned out. The freshet of August 4th, changed the channel of Putnam's creek on two and a half mile level, and turned it into prism of canal on five mile level, the old channel has been thoroughly cleaned out and the new channel filled up.

Temporary repairs have been made to the bulk-head and walls at Rocky Rift feeder.

The vertical wall on the berme side at Port Jackson has been relaid, and repairs made to the slope wall foot of lock 30, one mile level, and near lock 31, on six mile level.

The vertical wall at Yatesville having fallen down since the opening of navigation, a floating dock has been constructed at that point to guard against the sinking of boats.

One break has occurred on this section the past year, April 21st, 1871, at Yankee Hill culvert, while canal was being filled, caused by the excessive frost in the banks the winter previous. It was promptly repaired.

There has been a number of leaks found in the rock bottom on fourteen mile level and Rocky Rift feeder, and old leaks on five, six and fourteen mile levels, all of which have been stopped.

A new car and railroad track has been constructed at Snell's gravel bed, to facilitate the loading of repair scows.

The boat Toronto, sunk and abandoned on fourteen mile level, September 10th, 1871, was removed out of the channel of canal.



At least seven feet of water has been maintained on each level on this section the past season. September 13th, 1871, boat Van Sickler broke a gate, and run about four feet through side of Spraker's aqueduct; she was drawn back and a new gate inserted, causing a detention to navigation of sixteen hours.

No serious delays have occurred except as above stated, except twenty-four hours, while three mile level was drawn off to clean culvert at lock 34, on section 4.

The bulk-head and vertical wall at the head of the Rocky Rift feeder is in an unsafe condition, and has been with difficulty sustained the past season. The bulk-head will require to be entirely rebuilt, and the vertical wall relaid before the opening of navigation in the spring.

At least eight new lock gates will be required at locks Nos. 28, 29, 30 and 31, the coming season.

The wooden waste-weir at Mitchell's should be rebuilt of stone the coming winter. The old structure has stood for fourteen years, and it is unsafe to trust it any longer.

Under the appropriation for extraordinary repairs, the work of removing wall bench and constructing slope wall and pavement from Canajoharie to Fort Plain, was prosecuted as far as practicable. More material has been delivered, in readiness for work next spring.

The lengthening of Schoharie creek dam 160 feet, with new abutment walls and docking, has been completed in a very satisfactory manner. This is one of the most important and necessary improvements that has been made on the division. With this increased spillway and the protection walls, all the structures are much more safe and stable than ever before. A further appropriation of \$24,600 is needed to pay the full cost of the work.

### EXPENDITURES, SECTION No. 3.

#### I. ORDINARY REPAIRS.

##### 1. *Superintendent's Expenditures for Repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....	\$893 20	\$188 50	\$1,081 70
Lock tending.....		6,882 15	6,882 15
Lock-gates .....	2,643 14	2,081 19	4,724 33
Aqueducts .....	939 22	3,169 83	4,109 05
Waste-weirs.....		224 47	224 47
Culverts .....	2,823 32	1,469 59	4,292 91
Bridges .....	4,455 99	3,182 80	7,638 79

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
State scows .....		\$658 61	\$658 61
Work, etc., gravel bed....	\$627 87		627 87
Ice-breakers .....		185 93	185 93
Stopping leaks .....		1,279 42	1,279 42
Removing sunken boat ...		141 25	141 25
Raising and repairing tow- path and berme bank...		8,782 08	8,782 08
Cleaning prism of canal...		5,872 58	5,872 58
Cleaning creek channels ..		5,527 89	5,527 89
Dam .....		214 13	214 13
Slope and vertical wall....	90 25	379 00	469 25
Docking .....		1,200 01	1,200 01
Repairs of breaches .....		4,152 44	4,152 44
Watching canal.....		2,085 98	2,085 98
Tools .....		237 68	237 68
Miscellaneous .....		808 54	808 54
	<hr/>	<hr/>	<hr/>
	\$12,472 99	\$48,724 07	\$61,197 06
Clerk hire .....			862 50
Superintendent's salary.....			1,200 00
			<hr/>
			\$62,259 56
 2. <i>Miscellaneous Expenditures:</i>			
Gravel to repair break.....			64 03
			<hr/>
			\$62,323 59

## II. EXTRAORDINARY REPAIRS.

1. <i>Drafts on Auditor:</i>	
Wall bench, etc., from Canajoharie to Fort Plain.....	\$14,603 00
Lengthening Schoharie creek dam.....	17,799 00
2. <i>Miscellaneous expenditures:</i>	
Two bridges and ditch at Rocky Rift feeder .....	996 91
Advertising .....	212 59
Engineering.....	1,655 00
	<hr/>
	\$35,266 50

## SECTION No. 4.

DANIEL M. GOLDEN, *Superintendent of Repairs.*

Extends from foot of lock No. 34 to head of lock No. 45, at Frankfort, a distance of twenty-two miles.

The structures upon this section are twenty-four lift-locks; one guard-lock; ninety-eight lock-gates; four aqueducts; seven waste-weirs; ten culverts; twenty-four farm bridges (wood); ten road bridges

(wood); three road bridges (iron); one tow-path bridge (wood); one swing-bridge (wood); one dam; one feeder with bulk-head; two feeders with guard-locks; eight lock-houses; twelve watch houses; one collectors' office; two workshops.

Last spring Lock 41 was examined and found to be in bad condition. The flooring of the locks and culverts and the stone-work of the culvert needed thorough repairs. The old flooring of both locks and culvert was taken out and replaced with new, and thoroughly concreted. The cement in the walls of both locks, which had been washed out in many places, was replaced as far as possible. All the locks from 34 to 45, inclusive, have been extensively repaired this season.

Owing to the large number of locks, the cost of lock-tending is a very large item of the expense of the section. A liberal force has been employed and every facility furnished for rapid lockages.

The repairs to lock gates have been very extensive. The gates repaired extend from lock 34 to 45, inclusive.

The past year there has been eighty new lock-gates framed, of which two have been inserted.

Thirty-seven road and farm bridges have been repaired, and the approaches raised and graveled. Two new bridges have been built, and put up as follows: One iron chord road bridge at Dority's, on level between locks 41 and 42, and a swing-bridge across basin at Little Falls.

- The workshops at Little Falls and Mohawk have been thoroughly repaired.

The tow-path on this section from Lock 34 to 45 has been kept in good repair this season. The large stones have been removed and many low places filled to prevent the swells from the locks and the freshets in the spring from running over the tow-path.

Before opening of navigation in the spring the prism of canal from lock 34 to 45 was well cleaned, the bars that wash in from creeks were all taken out, and the loose stone and large boulders that lay in the bottom of the canal were removed, some of them being so large it was necessary to blast them.

There has been good navigation the entire season on this section; no detention whatever, with the exception of twenty-four hours, while cleaning culvert at Lock 34.

Repairs have been made to docking at Castle Creek, on five mile level, and on level between locks 36 and 37, at head of lock 40, at gravel bed, Fort Herkimer, and at head of lock 42.

Competent watchmen have been employed to watch the canal night and day, to assist boats, and to prevent crowds on section.

Four boats sunk on the section during the year. Assistance was rendered at an expense of \$624.70, of which amount \$515.20 was refunded.

At least seven feet of water has been maintained on each and every level on this section the past season, except about two weeks during the dry time this summer, when it was impossible to keep up the levels to their proper height on account of drawing from the long level at Utica. After the Oriskany feeder was opened early in October there was no further delays.

There should be 150 feet of docking put in at the head of lock 34, on the tow-path side. A new farm bridge should be put up at Berzie's, at Van Alostine's, on level between locks 34 and 35, at Carley's, above lock 39, and at Sfauring's, above lock 40. The docking on the walls on the sides of Castle Creek are in bad condition. There should be 650 feet of docking repaired or put in before spring.

At lock 35 there should be two new lower gates inserted and two new gates in Castle Creek aqueduct, on tow-path side.

The culvert called Crutzingers, on five mile level, between locks 35 and 36, closed four or five years ago, should be well cleaned out; the old masonry torn down and replaced with new. There should be about 100 feet of box culvert put on heel path side of Finck's dry dock; at lock 36 there should be one new gate inserted; lock 37, two new lower gates and two new mitre sills; also one new pier should be built; at lock 38 there should be one new gate inserted, two mitre sills and one new pier; at lock 39 there should be three new gates inserted, one mitre sill and one new pier; at lock 40 there should be one new gate inserted, and two new mitre sills; at lock 41 there should be one new gate inserted and two new mitre sills; at lock 42 there should be one new gate inserted and one new mitre sill; at lock 43 there should be two new gates inserted; also two new mitre sills; more work should be done to the tow-path between locks 42 and 43; at lock 44 there should be four new gates inserted, two new mitre sills, and one new pier should be built; two new gates and a new pier are needed at lock 45. From locks 40 to 45, under extraordinary repairs, a large amount of wall bench has been removed and new vertical wall built.

The experiment of utilizing the feed water at lock 37 has not been fully tested, but it promises to succeed. A further appropriation will be needed to test it fairly. Work on the bridge at Ilion has been stopped for want of funds.

A great improvement has been made by widening canal at head of lock 39, at Little Falls. The removal of rock bottom at Finck's basin, and rebuilding walls, has greatly facilitated navigation at that point. There remains still unexpended from the appropriation for this purpose the sum of \$2,076.81, which could be used to complete the work.

## EXPENDITURES, SECTION No. 4.

## I. ORDINARY REPAIRS.

1. *Superintendent's Expenditures for repairs etc.:*

	Cost of new structures.	Cost of repairs to old.	Total.
Locks .....	\$3,318 37	\$2,498 18	\$5,816 55
Lock tending.....		12,240 00	12,240 00
Lock-gates .....	3,037 87	5,379 68	8,417 55
Aqueducts .....	312 64	656 25	968 89
Waste-weirs.....		168 75	168 75
Culverts .....		165 10	165 10
Bridges, of all kinds, including abutments and approaches .....	944 47	5,129 80	6,074 27
Scows and ice-breakers ...		566 35	566 35
Lock-houses.....		146 16	146 16
Work-shops .....		583 75	583 75
Watch-houses.....		16 00	16 00
Raising and repairing tow-path and berme bank...		5,461 82	5,461 82
Cleaning prism of canal...		3,053 96	3,053 96
Cleaning out creeks and ditches .....		308 46	308 46
Dams .....		142 17	142 17
Slope and vertical wall....	224 00	724 62	948 62
Docking .....		1,113 04	1,113 04
Watching canal.....		1,452 33	1,452 33
Tools .....	123 08	737 88	860 96
Miscellaneous expenditures, .....		486 01	486 01
Sunken boats.....		109 50	109 50
	<hr/>	<hr/>	<hr/>
	\$7,960 43	\$41,139 81	\$49,100 24
Clerk hire .....			900 00
Superintendent's salary...			1,200 00
			<hr/>
			\$51,200 24

2. *Miscellaneous expenditures:*

Nine-inch pump, etc .....	708 55
Dredging and repairs to dredge .....	524 44
	<hr/>
	\$52,433 23

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor:*

Wall bench, etc., lock 40 to 41 .....	\$15,385 00
Wall bench, etc., lock 43 to 45 .....	23,154 00
Utilizing feed water at lock 37 .....	2,986 00
Wooden bridge at Ilion .....	578 00
Iron bridge at Ilion .....	4,114 96
Lengthening culvert at Frankfort .....	817 86

2 *Miscellaneous expenditures:*

Engineering .....	2,432 58
Advertising .....	178 50
Removing rock bottom Finck's basin .....	2,923 19
Improvement head of lock 39, Little Falls .....	1,379 15
Vertical wall at Little Falls .....	200 00
	<hr/>
	\$54,149 24
	<hr/>

## SECTION No. 5.

CHARLES GRAHAM, *Superintendent.*

This section extends from the head of lock No. 45 at Frankfort, to the east bank of the Oneida Lake canal at Higginsville, nine miles west of Rome, a distance of thirty-four miles.

The structures upon this section are: One lift lock; one weigh lock; four aqueducts; twenty-nine culverts; twenty-three farm bridges (wood); six farm bridges (iron chord); eighteen road bridges (wood); eighteen road bridges (iron); one towing-path bridge (iron); one foot bridge (wood); two foot bridges (iron); two lock-houses; two workshops; two watch-houses; one collection office at Utica.

This section was in charge of Giles Hawley, superintendent, up to February 1st, 1871.

Three new gates have been inserted on this section. Two new gates will need to be inserted at lock 46, and two at the weigh-lock, before the opening of navigation the coming spring.

New sides throughout have been put into the Frankfort and Ferguson aqueducts, and the floors of both have been thoroughly overhauled, and about one-third of them replaced by new; and their walls, and abutments, together with those of the Sauquoit Creek aqueduct, have been thoroughly repaired during the season.

Slight repairs have been made to the four waste-weirs on the section.

The bulk-heads and wood work of all these waste-weirs require thorough and extensive repairs, and a considerable amount of new timber taken down and reconstructed throughout during the coming winter.

The first culvert east of Clark street bridge, in the city of Utica, has been thoroughly repaired at each end, arches relaid and cleaned out; as also has the one at halfway bridge, the north end of which it was necessary to take up and reconstruct.

The three-arch culvert at starch factory having become filled up and almost useless, from long-neglect, has been cleaned throughout, and also the bed of the stream below it.

The usual difficulty was experienced in getting Whittalls Creek culvert in a safe condition before opening of navigation. An entire new structure is needed; in my opinion nothing will answer the purpose so well, to facilitate the passage of this turbulent and rapid stream under the canal, as iron tubes of a sufficient capacity to discharge its water at a time of freshet.

Sundry repairs have been necessary to the Utica weigh lock, which was put in perfect order.

This weigh-lock consumes a large amount of water, and in time must be removed to Frankfort, where the water used can be passed into the level below.

The leakage from the discharge culvert, leading from this weigh-lock, is considerable.

New frames and gates should take the place of those now at the head of the culvert, before the resumption of navigation.

The roof of the building should be repaired or renewed. Eight bridges were repaired before February 1st, 1871, and Franklyn road bridge rebuilt with slight repairs to the foot bridges.

Five new wood farm bridges have been rebuilt, viz.: Thomas, Fort Bull, Cold Spring, Chrisman's and Hawley's basin; also, new wood-work has been supplied to the Jay street iron road bridge, and to the Broad street double iron road bridge in the city of Utica.

Nine road bridges have been thoroughly repaired, with slight repairs to abutments and approaches, and to the other bridges on the section.

Five bridges will need to be repaired or rebuilt during the coming year, viz.: Van Burens, Starrings, Four mile grocery, Hulse's and Dry Dock.

The starch factory bridge on the eastern side of Utica, should be replaced by a Whipple patent iron double bridge.

The Genesee street bridge in the city of Utica, should have a new floor throughout, be raised in the center, have the stone stairs on the east side relaid, and other general repairs. It is the lowest bridge on the section, and many accidents occur at this point.

The workshops, both at Utica and Rome, have been put in good order, with good substantial board fences, and locks to gates, doors, etc.

The repairs and raising towing-path and berme banks of the section, including setting snubbing posts, have been prosecuted throughout the season, and many dangerous places made safe.

On the 13th of March, 1871, owing to the giving away of the earth dam which confined the Utica skating park and ice pond, situated above the starch factory, three miles east of that city, quite a serious break into the canal occurred at that point, carrying away fifty feet of the berme bank, filling the prism of canal with earth and gravel, and undermining the wall opposite. It was repaired with as much expedition as possible, and was ready for the opening of navigation at the time appointed in April. The bank opposite has since been strengthened by putting in heavy crib-work, and filling the same with earth and stone, and also by boating gravel.

Navigation has been somewhat impeded by the lack of water, which, owing to the remarkable dryness of the past year, commenced to be serious as early as the 25th of June, and continued up to the time of making this report September 30th, 1871. The promptness and efficiency of Mr. P. P. Midler, who is in charge of the water reservoirs, and also Messrs. Cole and Miller, superintendents on the Black River canal, prevented any detention of very long duration.

There has been no delay, except a few hours at a time, and no crowds of boats on the section during the season.

Under extraordinary repairs, a large amount of vertical wall has been built or put under contract in Rome and Utica, to accommodate the increasing business of those cities, the details of which will be found in the tables annexed.

The improvement of Miller's basin in the city of Utica, now under contract, will give increased facilities for business in that city.

The work on Oriskany feeder was begun on the 28th of August, 1871; a further account of which will be given hereafter in the general remarks on the supply of water.



## EXPENDITURES, SECTION No. 5.

## I. ORDINARY REPAIRS.

1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....		\$20 04	\$20 04
Lock-tending .....		1,121 88	1,121 88
Lock-gates .....	\$300 00	369 76	669 76
Aqueducts .....	900 00	398 09	1,298 09
Waste-weirs .....		236 95	236 95
Culverts .....		854 26	854 26
Weigh-locks .....		137 82	137 82
Bridges of all kinds, inclu- ding abutments and ap- proaches .....	2,816 78	7,904 64	10,721 42
State scows .....		299 72	299 72
Lock-houses .....		137 51	137 51
Workshops .....		519 06	519 06
Raising and repairing tow- path and berme bank ...		12,304 00	12,304 00
Cleaning out prism of canal .....		5,064 74	5,064 74
Cleaning out creeks .....		1,011 65	1,011 65
Dams .....		445 81	445 81
Slope wall .....		461 37	461 37
Docking .....		879 83	879 83
Repairs of breaches .....		1,150 72	1,150 72
Watching canal .....		2,174 79	2,174 79
Miscellaneous expenditures .....		618 05	618 05
	\$4,016 78	\$36,127 45	\$40,144 23
Clerk hire .....			900 00
Superintendent's salary ...			1,200 00
			<u>\$42,244 23</u>

2. *Miscellaneous expenditures:*

Labor in April, 1870 .....	22 50
Dredging .....	479 95
Repairs to Utica weigh-lock .....	414 31
	<u>\$43,160 99</u>

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor :*

Iron foot bridge, Utica .....	\$1,483 15
Iron bridge, Schuyler street, Utica .....	1,700 00
Removing wall bench and building vertical wall, Rome,	7,580 43
Removing wall bench and building 900 feet docking	
berme bank, Rome.....	1,119 11
Removing wall bench and building vertical wall, Utica,	2,448 00
Removing wall bench and building vertical wall, Utica,	1,394 46

2. *Miscellaneous expenditures :*

Engineering .....	2,839 79
Advertising .....	198 61
Oriskany feeder .....	2,630 71
	<hr/>
	\$21,394 26

## III. AWARDS OF CANAL APPRAISERS.

Draft on Auditor .....	\$340 00
Certificates for awards .....	227 50
	<hr/>
	\$567 50

## CHAMPLAIN CANAL.

## SECTION No. 1.

GEORGE W. NEILSON, *Superintendent of Repairs.*

Extends from a point 200 feet north of Cohoes guard-lock, including Waterford side-cut, to foot of first lock north of Saratoga dam, a distance of twenty-eight miles.

The structures on this section are: Eleven locks; one weigh lock; forty-four lock gates; one aqueduct; eleven waste-weirs; seven culverts; forty-two farm bridges; twenty-six road bridges (wood); two road bridges (iron); eight tow-path bridges; six lock-houses; seven watch-houses; three store-houses; two workshops; ten foot bridges; one collector and weigh-office; Saratoga dam, 900 feet; Cohoes dam, 1,600 feet long.

The Champlain canal was opened April 17th, 1871. The locks and lock-gates were put in good repair before the opening of navigation. The additional force has been kept at three locks near Waterford, to assist navigation at this point. This must be continued until they are rebuilt. They have been put under contract, with about one-third of a mile of section work to be finished in the spring of 1873.

The Wilbur's basin waste-weir was thoroughly repaired in April, with slight repairs to the others on the section.

The Waterford weigh-lock required repairs and readjustment early in the season, at considerable expense. It is now working satisfactorily to all concerned. A large amount of the ore business on this canal depends wholly on this scale for determining the weight of the ore freighted and sold.

Six bridges have been constructed, and many others repaired. A new stone abutment and wing-walls have been laid at Tompkins bridge in Stillwater.

The ordinary work of raising and strengthening tow-path has been continued through the season, with necessary work upon the dams and the docking on the section. On filling the canal in the spring, there was a large amount of leakage through the gravel under the new vertical walls at Waterford. It became necessary to draw the level, puddle the bottom of the canal, and concrete outside of the walls. The work was thoroughly done, and the difficulty remedied.

On the 18th of July, 1871, the center pier of the Schuylerville aqueduct undermined at the east end and made a large break in the trunk of the aqueduct. A timber crib was constructed, filled in, and surrounded with stone, to support the frame of the aqueduct. These, and other temporary repairs were made, and navigation resumed in four days.

A new aqueduct on the enlarged plan was recommended to the Canal Board, and has since been adopted, and the work advertised and let to be built north of the present structure. The structures on this section, except this aqueduct, are in good repair. There have been several sunken boats on the section from overloading and negligence of those managing them, but in no case has navigation been delayed from this cause.

There has been no delays in navigation during the season, except those arising from the leakage at Waterford in April, and the break at Schuylerville. There has been an average depth of water of over five feet maintained upon the levels of this section during the season.

The south end of the Saratoga dam at Fort Miller bridge under contract, has been rebuilt of stone in a very thorough and substantial manner, nearly up to the angle of the dam. As this was the most hazardous portion, the remainder of the old dam will require but slight repairs.

The Cohoes dam of stone has been completed. The wooden guard-lock at the north end of the dam requires further repairs.

## EXPENDITURES, SECTION I, CHAMPLAIN CANAL.

## I. ORDINARY REPAIRS.

1. *Superintendent's expenditures for repairs, etc. :*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks.....		\$824 92	\$824 92
Lock-tending.....		6,475 75	6,475 75
Lock-gates.....	\$494 00	616 93	1,110 93
Waste-weirs.....	500 00	1,718 52	2,218 52
Culverts.....		95 75	95 75
Weigh-locks.....	300 00	879 69	1,179 69
Bridges of all kinds.....	2,914 25	2,269 74	5,183 99
State scows.....	240 00	131 52	371 52
Ice-breakers.....		68 81	68 81
Raising and repairing tow- path and berme bank...		8,784 14	8,784 14
Cleaning out prism of canal,		2,289 65	2,289 65
Dams.....		1,456 95	1,456 95
Docking.....	1,418 92	2,747 92	4,166 84
Repairs of breaches.....	5,464 72	3,677 58	9,142 30
Breaking ice and assisting boats.....		518 65	518 65
Watching canal.....		2,288 58	2,288 58
Pier at Mohawk river....	322 00		322 00
Miscellaneous expenses....		551 30	551 30
	<hr/>	<hr/>	<hr/>
	\$11,653 89	\$35,396 40	\$47,052 29
Clerk hire.....			900 00
Superintendent's salary.....			1,200 00
			<hr/>
			\$49,150 29

2. *Miscellaneous expenditures :*

Dredging and repairs to State dredge.....	2,619 93
Repairing tow-path bridge, Cohoes.....	1,208 50
George Heath, repairs to Becker's lock.....	186 50
Dump scows for dredge.....	1,800 00
Land damages.....	242 00

3. *Drafts on Auditor :*

Hewett's lock.....	7,894 99
Flynn's lock, (chargeable to repairs).....	22,185 00
Repair contract (Wells, 1869).....	7,717 50

*Certificate for award by Canal Board :*

Becker's lock, act chap. 160, Laws 1870.....	7,493 49
	<hr/>
	\$100,498 20

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor :*

Repairs to dam at Fort Miller bridge and to Cohoes bridge in 1868 and 1869, act, chapter 877, Laws 1869,	\$5,000 00
Improvement of Champlain canal in 1869, act, chapter 877, Laws of 1869.....	9,491 25
Improvement of Champlain canal, change of plan of bridges in 1868 and 1869.....	7,214 56
Vertical wall at Waterford.....	6,970 00
Flynn's lock (excess over old plan).....	17,000 00
Stone dam (known as Saratoga dam), at Fort Miller bridge.....	16,660 00
Engineering Champlain enlargement.....	14 900 00

2. *Miscellaneous expenditures :*

Engineering.....	3,827 00
	<u>\$81,062 81</u>

## III. AWARDS, ETC.

Counsel fees in claim cases.....	\$300 00
Certificates for awards.....	6,357 29
	<u>\$6,657 29</u>

## SECTION No. 2.

GEORGE SATTERLEE, *Superintendent of Repairs.*

Extends from foot first lock north of Saratoga dam, to a point thirty-three feet south of road bridge at Dunham's basin, including the Glen's Falls feeder, feeder dam, and pond above, a distance of twenty-four miles.

The structures upon the section are: Nineteen locks; sixty-six lock gates; three aqueducts; six waste-weirs; nine culverts; eighteen farm bridges (wood); twenty-three road bridges (wood); three road bridges (iron); three tow-path bridges (wood); fourteen foot bridges (wood); seven sluiceways around locks (wood); three lock-houses; two workshops; ten watch-houses; one storehouse; one timber shed; one collector's office; one dam 900 feet long, at head Glen's Falls feeder.

This section has been kept in good repair at a much less expense than last year.

There has been new hollow quoins and recess coping laid at locks No. 5 and 12, and 1 and 5 combined Glen's Falls feeder; new machinery to operate tumble gates at Fort Miller lock. The sides of lock 12 have been dressed down, Saratoga discharge lock, and locks

11 and 12, 5 and 2 combined, have been repaired with slight repairs to other locks on the section.

Eleven new gates have been constructed and inserted, four at 5 combined, four at 2 combined, and three in lock 1, nearly all the other gates on the section have been thoroughly repaired. There has been a new wood sluiceway constructed around lock 5, and timber cribs, filled with stone, at head and foot of same; new bulk-heads around 5 combined and thoroughly repairing all the other sluices on Glen's Falls feeder dam.

Repairs have been made to Gamble's, Lincoln's, and Dunham's basin waste-weirs.

There has been six bridges constructed: One farm bridge at Bristol's; one farm and road bridge at Slocum's; one road bridge with sidewalk at Notre Dame street, in the village of Fort Edward; one road bridge at Brisbin's; one change bridge at Fort Miller, and one foot bridge at lock 1, Glen's Falls feeder; nearly all the other bridges on the section have been repaired and approaches raised.

Several leaks have occurred in the Glen's Falls feeder, in the rock bottom, which were stopped by filling seams with concrete and gravel.

New lock-houses for use of lock-tenders, have been constructed at locks 4 and 5, Glen's Falls feeder, and one new watch-house built.

The towing-path on one, two, three, five and twelve mile levels, and Glen's Falls feeder has been raised, widened, and strengthened nearly the entire length, to guard against breaks and overflow of water.

The prism on nearly the entire main canal, from Saratoga discharge lock to Dunham's basin, has been bottomed out to a uniform width of thirty-five feet on bottom, and giving five feet of water as provided by chapter 186, Laws of 1864. Also, the channel of the Glen's Falls feeder has been cleaned out to its original depth and width.

A new timber crib was constructed for additional support to Glen's Falls feeder dam, in the fall of 1870, which was then in a dangerous condition; and some further expense was incurred in stopping leaks in same, and bracketing in low water.

New docking has been constructed on one, three, five and twelve mile levels, and the old repaired on one, two, three, five and twelve mile levels and Glen's Falls feeder.

Two breaks have occurred on this section the past season. April 17th, at Peter Rozell's coal yard in village of Fort Edward, caused by weakening embankment in consequence of widening canal at that

point; navigation delayed thirty-six hours. September 2d, near steam mill, Glen's Falls feeder, caused by old water-course through seams in rock under prism.

Competent watchmen have been employed on the high and dangerous embankments, night and day, during the season.

April 27th, boat J. F. Howe, loaded with lumber, sunk at 2 combined; cause, sprung a plank; six hours' detention on Glen's Falls feeder only. May 4th, boat Glenn, loaded with lumber, sunk on twelve mile level, at mouth of feeder, caused by running into vertical wall; no detention to navigation. September 22d, boat W. A. Miller, loaded with lime, sprung a leak and burned at Pike's basin, five mile level; no detention.

At least five feet of water has been maintained, on each and every level on this section, the past season.

October 8th, 1870, turnable gate at Fort Miller lock broke; navigation delayed ten hours. October 20th, 1870, heel-path gate at lock 1, G. F. feeder, went out while filling; navigation delayed forty-eight hours on G. F. feeder only. May 11th, 1871, tow-post in lower gate, Fort Miller lock, broke; navigation delayed twenty-four hours. June 23d, 1871, lower gate at Bassett's lock went out while filling; navigation delayed forty-eight hours; navigation delayed eighteen hours while mowing eel-grass in Glen's Falls feeder.

Houses should be erected for the accommodation of lock-tenders at Bassett's, Fort Miller, and Fort Edward; and the lock-house at Moseskill should be thoroughly repaired, as it is almost impossible to secure good and reliable men for the position, without furnishing them proper accommodations.

Twelve new lock-gates will be required on this section.

The wood trunk at Moseskill and Slocum's aqueduct will require to be thoroughly repaired before navigation opens in the spring.

The high and dangerous embankment, at points where it divides the canal and river, should receive additional protection, either by piling or timber cribs filled with stone.

The embankment on the berme side at Blake's culvert, on five mile level, should be also supported by timber cribs filled with stone.

Tubbs' waste-weir is abandoned, and should be taken up. Lincoln's, Gamble's, and Dunham's basin waste-weirs should be rebuilt on an enlarged plan. And the capacity for the discharge of water at Fort Edward aqueduct should be doubled.

The canal on the five mile level, between the Argyle and covered bridges in the village of Fort Edward, should be enlarged the coming

winter, as per survey and maps, approved by the Canal Board. It is now but twenty-eight feet on bottom, with high clay embankment on berme side, and no wall to protect it, and is constantly sliding in canal, so that two boats can hardly pass.

The system of repairs under the immediate supervision and control of the State canal officers, instead of contractors, has worked wholesome and very desirable results.

Whatever work is done is performed thoroughly, and with a view to permanency, and we have, therefore, a better canal, and in a condition which meets the wants and commands the approval of forwarders and boatmen on the entire line.

The work of rebuilding Glen's Falls feeder dam was commenced by the commissioner, January 15, 1871, and prosecuted through the year. The improvement contracts on this section were closed by resolution of the Canal Board, and certificates issued for the final accounts.

## EXPENDITURES, SECTION 2, CHAMPLAIN CANAL.

### I. ORDINARY REPAIRS.

#### 1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....	\$342 90	\$1,077 42	\$1,420 32
Lock-tending .....		10,092 49	10,092 49
Wood sluice-ways around locks .....	1,443 17	372 45	1,815 62
Lock-gates .....	3,139 74	655 28	3,795 02
Waste-weirs .....		185 75	185 75
Mowing eel-grass in feeder, Bridges .....	2,315 54	54 50	54 50
State scows .....	1,644 64	958 03	3,273 57
Stopping leaks .....		168 80	1,813 44
Collector's office .....		1,752 36	1,752 36
Lock-houses .....	983 59	17 65	17 65
Watch-houses .....	313 71		983 59
Raising and repairing tow- path and berme bank...	5,470 00		313 71
Cleaning prism of canal ..		6,395 21	11,865 21
Snubbing-posts .....	11 75	3,559 62	3,559 62
Dams .....	705 05		11 75
Slope and vertical wall....	130 65	91 00	796 05
Docking .....	612 39	100 00	230 65
Repairs of breaches .....	600 00	559 75	1,172 14
Watching canal .....		3,009 80	3,609 80
Miscellaneous .....	35 12	2,870 00	2,870 00
		695 21	730 33
	<hr/>	<hr/>	<hr/>
	\$17,748 25	\$32,615 32	\$50,363 57



Clerk hire.....	\$900 00
Superintendent's salary .....	1,200 00
Total.....	<u>\$52,463 57</u>

2. *Miscellaneous expenditures :*

Glen's Falls feeder dam (chargeable to repairs) .....	20,705 91
Dredging feeder .....	523 95
Water expenses for feeder in 1870.....	110 00
	<u><u>\$73,803 43</u></u>

II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor :*

Improvement from Fort Miller lock to Moseskill lock,	\$442 00
Improvement from Saratoga lock to Fort Miller lock..	408 00
Improvement from Moseskill lock to Fort Edward lock..	2,924 00
Guard lock head of Glen's Falls feeder.....	6,752 35
Vertical wall, Sandy Hill .....	14,178 00
Vertical wall and stop-gate, Fort Edward.....	1,521 60
Engineering (improvement).....	3,885 89
Argyle change bridge, Fort Edward .....	5,049 00

2. *Miscellaneous expenditures :*

Stop-gates, foot Glen's Falls feeder.....	1,887 74
Advertising .....	221 81
Engineering .....	1,116 00
Glen's Falls feeder dam (appropriation from extraordinary repairs) .....	25,000 00
	<u><u>\$63,386 39</u></u>

III. AWARDS OF CANAL APPRAISERS.

Certificates for awards .....	<u><u>\$5,739 76</u></u>
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SECTION No. 3, CHAMPLAIN CANAL.

GEORGE NORTHUP, *Superintendent.*

Extends from a point thirty-three feet south of the road bridge at Dunham's basin to a point 300 feet north of the foot of the combined locks at Whitehall, a distance of twenty-two miles. The structures upon this section are eight locks; twenty-eight lock gates; five waste-weirs; two culverts; twenty-two farm bridges (wood); ten road bridges (wood); four tow-path bridges (wood); six foot bridges (wood); five watch houses; four dams across Wood creek.

The general repairs for the season upon this section have been thorough and extensive.

The Fort Ann, Parish Guard and Whitehall locks have been thoroughly repaired.

Four new lock-gates have been constructed and inserted as follows: One in upper combined locks, Fort Ann; one in single lock, Fort Ann; two at Parish lock; and extensive repairs made to other gates, valves and castings connected with the same on the section.

Repairs have been made to Smith's basin, Empey's, Eastman's and Blevins' waste-weirs.

The culvert in village of Whitehall has been cleaned out and repaired.

The tow-path bridge at Fort Ann has been rebuilt, a new foot bridge constructed at Fort Ann combined locks, and nearly all the bridges on the section repaired, and approaches to same raised and graveled.

The workshop on the section having become worthless, a new one has been erected with good work and store room in a convenient location at Fort Ann on twelve mile level.

New watch-houses have been erected at Fort Ann, combined guard and Whitehall combined locks.

The towing-path on twelve and five mile levels has been raised and graveled nearly their entire length, the paved towing-path on Wood's creek thoroughly repaired and graveled, and the berme bank near railroad bridge on five mile level raised and strengthened.

The dams on Wood creek, also the valves and the castings connected with the same, have been repaired.

The prism of canal on twelve and five mile levels has been thoroughly cleaned out, the slide at Gates' landing on twelve mile level taken out and channel made wider at that point, and numerous bars and other obstructions removed from the channel of Wood creek.

New docking has been constructed, and the old extensively repaired on twelve and five mile levels and Wood creek.

New slope and vertical wall has been constructed and the old repaired on twelve and five mile levels, and a large amount of new vertical wall constructed on Wood creek to replace that destroyed by floods.

Competent watchmen have been employed on twelve and five mile levels, and wherever necessary.

The basin at Fort Ann has been bottomed out to a depth of five feet, in order to admit boats drawing four feet four inches of water.

The remains of a coffer dam at foot of lower locks, Whitehall, causing much detention during times of low water in the lake, have been removed.

At least five feet depth of water has been maintained on all the levels on this section during the past season. There has been but three days' detention to navigation on this section the past season, caused by high water in Wood creek; and no other detention has occurred except from causes off this section.

Smith's basin and Empey's waste-weirs should be rebuilt during the coming winter, the present structures not being of sufficient capacity during heavy rains, besides being old and unsafe.

I would also recommend the construction of an iron road bridge at Dunham's basin in place of the present wood structure, and the rebuilding of the Cook road bridge.

The following bridge abutments will also need rebuilding, and those on berme side should be rebuilt the coming winter: One on berme side at Smith's basin, and tow-path of Baker's road bridges, also berme of Kenner's farm bridge on five mile level.

Under the appropriation for change of plan of bridges, a new draw bridge upon Cooper's plan, had been built at Fort Ann.

The dredging in Whitehall basin has greatly improved the channel and the entrance to the basin. East river and Wood creek bring in a large amount of deposit every year. A large portion of this work beyond the foot of the combined locks should be done by the United States, but the rights of the State of New York and the interest of the business of the Champlain canal in this and in other important matters connected with the navigation of Lake Champlain, have failed to receive the attention they deserve from the general government.

## EXPENDITURES, SECTION 3, CHAMPLAIN CANAL.

### I. ORDINARY REPAIRS.

#### 1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....	\$243 75	\$697 42	\$938 47
Lock-tending .....		4,447 50	4,447 50
Lock-gates .....	1,455 50	797 73	2,253 23
Waste-weirs .....	75 00	596 52	670 52
Culverts .....		116 75	116 75
Bridges .....	2,392 00	1,248 67	3,640 67
State scows .....		205 51	205 51
Workshops .....	2,506 46	9 30	2,515 76
Watch-houses .....	177 50	35 02	212 52
Raising and repairing tow- path and berme bank...	1,480 00	3,273 71	4,753 71

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total
Cleaning prism of canal...	\$525 00	\$1,200 25	\$1,725 25
Bottoming out basin at Fort Ann .....	657 12	.....	657 12
Dams .....	75 00	474 17	549 17
Slope and vertical wall....	2,963 13	1,856 99	4,820 12
Docking.....	1,875 00	722 94	2,597 94
Coffer dam at Whitehall..	200 00	137 50	337 50
Watching canal.....	.....	1,291 50	1,291 50
Miscellaneous .....	.....	418 14	418 14
	<hr/> \$14,625 46	<hr/> \$17,529 62	<hr/> \$32,155 08
Clerk hire .....			900 00
Superintendent's salary .....			1,200 00
			<hr/> \$34,255 08

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor:*

Dredging Whitehall basin.....	\$11,101 00
Iron bridge Fort Ann .....	2,423 00
Improvement section two, twelve mile level.....	3,043 00
Improvement section three, twelve mile level.....	2,958 00
Engineering (enlargement) .....	4,500 00

2. *Miscellaneous expenditures:*

Engineering.....	622 00
Advertising .....	19 25

3. *Certificates issued:*

Improvement section two, twelve mile level, final....	11,064 89
Improvement section, three twelve mile level, final....	13,513 26
Slope wall and pavement on Whitehall level .....	5,084 90
	<hr/> \$54,329 30

## III. AWARDS OF CANAL APPRAISERS, AND EXPENSES.

Certificates issued.....	\$40,557 90
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1. *Miscellaneous expenditures:*

Witness' fees, etc. ....	62 40
	<hr/> \$40,620 30

## BLACK RIVER CANAL.

## SECTION No. 1.

JOHN COLE, *Superintendent.*

Extends from the junction of the Black River canal with the Erie canal at Rome, to a point on the summit level, 1,000 feet north of lock No. 70, including the Delta feeder, and is twenty-four miles in length.

The structures upon this section are seventy locks (lift); one guard-lock (on Delta feeder); five aqueducts; five waste-weirs; ten culverts; fifteen road bridges (two iron); seventeen farm bridges; two draw bridges; two change and road bridges; twenty lock-houses; sixteen watch-houses; two dams, one at Delta, on the Delta feeder, and one between locks Nos. 33 and 34.

The following new structures were completed during the fiscal year, viz.: Eight lock-gates were framed and seven inserted.

Six new bridges were constructed, known as follows: Elmer Hill, Farr's, Hicks', Brayton's farm, Brayton's road, and Floyd hill.

A structure of brush and stone, between locks 52 and 53, commenced during the fiscal year ending September 30th, 1871, to strengthen banks and guard against land slides, was completed, and three similar structures located between locks 25 and 26, 31 and 32, and 33 and 34, to protect banks against the washing of Lansingkill creek, and to change the current of said creek, have been completed.

The docking has been put in under all the bridges, from Erie canal to lock 47.

Repairs to the locks and sluices have been made where necessary, and together with repairs upon all the lock-gates on the section, except those on Delta feeder, and where new ones were inserted.

Fourteen bridges have been repaired.

The following named structures ought to be thoroughly repaired the coming year: Locks 33, 39, 40, 41, 42, 45, and several others leak through the sides to such an extent as to undermine and carry away portions of the towing-path. This difficulty is becoming more serious every year.

It will be necessary to make and insert twenty new lock gates in the spring of 1872.

The following named bridges will require repairing or rebuilding: Huntington, Walsworth, Rogers, Wager, Crowell and Yerdon's.

Railroad aqueduct, between locks 13 and 14, will require thorough repairs.

The canal was bottomed out its entire length, from Erie canal to lock 70; about eight miles of towing-path was raised and repaired, at different points, extending over the entire section.

No breaks have occurred on the section during the fiscal year.

Near the close of navigation, in 1870, the canal boats Tom and Kit, of Albany, sunk in lock 44, caused by the management of the crew in charge.

There has been two and one-half days' delay in navigation, during the year, one day delay caused by a lock-gate going out at lock 36, and one and a half day's delay by sluice going out at lock 50.

The depth of water maintained on the lower mitre sill, at each of the locks on the section, during the last year, was four feet and two inches.

## EXPENDITURES, SECTION 1, BLACK RIVER CANAL.

### I. ORDINARY REPAIRS.

#### 1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....		\$2,647 66	\$2,647 66
Lock-tending .....		8,850 49	8,850 49
Lock-gates .....	\$2,138 94	2,377 22	4,516 66
Aqueducts .....		396 97	396 97
Waste-weirs .....		221 94	221 94
Culverts .....		307 00	307 00
Bridges .....	2,512 39	2,126 60	4,638 99
State scows .....		276 14	276 14
Lock-houses .....		666 33	666 33
Removing aqueducts and bracing locks .....		533 50	533 50
Raising and repairing tow- path and berme bank .....		4,594 86	4,594 86
Cleaning prism of canal ..		1,842 87	1,842 87
Dams .....		189 90	189 90
Docking .....		204 04	204 04
Protecting banks .....	1,609 48		1,609 48
Watching canal .....		294 00	294 00
Tools .....	107 42	72 60	180 02
Miscellaneous .....		767 47	767 47
	\$6,572 27	\$21,165 56	\$32,737 82
Clerk hire .....			900 00
Superintendent's salary .....			1,200 00
			<u>\$34,837 82</u>

## II. EXTRAORDINARY REPAIRS.

1. <i>Drafts on Auditor:</i>	
Iron road bridge, Floyd street, Rome.....	\$2,040 00
Iron bridge, Dominick street, Rome .....	2,673 20
Improvement (1868 and 1869) .....	3,993 92
2. <i>Miscellaneous expenditures:</i>	
Advertising .....	50 75
	<hr/>
	\$8,757 87
	<hr/>

## SECTION No. 2.

R. SANFORD MILLER, *Superintendent.*

This section extends from a point on the Summit level, 1,000 feet north of lock No. 70 to Black river, below lock No. 109, a distance of twelve miles; including, also, the Moose river improvement, above the dam at Lyon's Falls, one mile and a half; the Boonville feeder to Forest Port, ten and one-half miles; the Black river, above the dam at Forest Port, two miles; and also, the North Branch, South Branch and Woodhull reservoirs.

The structures on this section are: Thirty-nine lift locks; one guard lock; twelve lock-houses; three watch-houses; one State shop; one timber shed; two keepers' dwelling-houses, one each at North Branch and Woodhull reservoirs; two dams on Black river; one aqueduct; six waste-weirs; ten culverts; two stop-gates; seventeen bridges; one iron chord bridge; twenty-one farm bridges; one road and change bridge; one farm change bridge; one tow-path bridge.

Of these structures the following are new, having been rebuilt during the fiscal year:

Douglass' farm and change bridge, with stone abutments; Williams', Hayes', Jackson's, Carpenter's, W. Post's, and Cone's bridges, and new abutments to Pitcher's bridge, and a new watch-house, at lock 92.

The entire tow-path on Sugar river aqueduct has been rebuilt.

Sixteen new lock-gates have been built, and oak timber for seventeen more gates procured and on hand.

New iron wicket-gates have been substituted for wood slide-gates in the waste-weirs at Lee's, Butts' and Alder creek.

New docking has been put in at the head of all the locks on the section.

The locks and lock-gates in locks Nos. 71 to 109 have been kept in good repair through the season of navigation.

Eight road bridges and twelve farm bridges have been repaired; also, eight lock-houses.

The State shop, Boonville, has been thoroughly repaired and painted.

The following structures should be repaired or rebuilt during the coming year, viz.:

Forest Port, Slocum's, Pitcher's, Roberts', Cooper's, Tyler's, Clark's, Malcomb's, Phelps' and tow-path bridge, on feeder, at Boonville.

At least twenty-five new lock-gates should be put in before the opening of navigation next spring. Economy demands this as the cost of keeping the old gates in repair is not less than forty per cent of the cost of new gates, which with fair usage need no repairs for a number of years.

The sluices around the locks (being built of timber), are very much decayed, and many of them, ten at least, should be rebuilt before the opening of navigation next spring.

The banks of the feeder being in most cases high, and all of very light material, have from the effect of time and the action of the elements, become in many places low and weak and need constant care, and should be immediately and permanently strengthened by secure structures of piling, and brush and stone.

This is of the highest importance. If a break should occur at any point, it would be very disastrous, requiring a great outlay of money to repair, and absolutely stopping navigation, not only on this canal, but on the Erie also, as the long level of that canal cannot be kept up any length of time on any portion of the season without the water which is supplied to it from Black river, and the reservoirs in the north woods, all of which passes through this feeder.

The entire section of canal and feeder was properly bottomed out before the opening of navigation.

The tow-path and berme bank of canal has been raised and strengthened at several points, viz., each side of Sugar river aqueduct, over and each side of Clark culvert, below lock 94, over and each side of Lydon culvert, below lock 95 on the Crandall culvert, over the Lee culvert, and on the Koon farm, near Gossman culvert.

The tow-path has been raised and graded for seven miles between Boonville and lock 98, and the banks of feeder have been strengthened at weak points between Hawkinsville and Forest Port.

No breaches have occurred during the year.



Two boats have been sunk on section one, below lock 98, and one in lock 77. No delay to navigation in either case.

The only delays to navigation on the section have been two; one of four and one of five days, on that portion of the section north of lock 71, when the extreme low water at the Rome level of the Erie canal made it necessary to shut off the feed entirely north of lock 71, and send all the water possible to the Erie canal until the Rome level was full. These two unavoidable delays on this portion of the section are all the detentions of the season.

Except in the causes named above, a full depth of four feet of water has been maintained on the lower mitre sills of each dock on the section during the season of navigation.

Another point deserves particular attention. The extreme dry weather of this season has demonstrated the fact that the present size of the feeder is not sufficient to pass all the water at times needed for the Erie canal, and at the same time keep up navigation at the feeder.

During the heaviest feeding with water four feet and four inches deep at the head of feeder, at its mouth at the summit level of the canal the depth did not exceed two and one-half feet. This was caused by feeding from the summit for the Erie canal faster than the water could pass down the feeder, while on the other hand, when only feeding from the summit, water sufficient to navigate the Black river canal, the water at four feet at mouth of feeder would only be two and one-half at head of the feeder at Forest Port.

Both these difficulties would be entirely obviated by deepening the feeder two feet its entire length, which idea would seem to have been entertained in the original plan of construction, as the bottom of the guard-lock is now over two feet lower than the bottom of feeder.

This deepening done would insure sufficient capacity to pass all the water needed for the Erie canal at all times, and allow uninterrupted navigation of the feeder.

The business of the Black River canal shows a decided increase over last year, and boatmen and shippers seem to have regained confidence in the canal as a sure and cheap means of transportation. Prospects are that there will be a still greater increase of business for the coming year.

The work at Woodhull reservoir has been completed, and sixteen feet of water over 1,200 acres was retained during the winter and spring of 1871. This was all used during the summer to supply the long level.

The building of a new reservoir below Woodhull, known as Sand

lake reservoir, fed from Mud lake, and second Bixby lake, was authorized by the Canal Board; a full account of which will be found in my remarks on "Supply of water."

The iron bridges at Port Leyden and Boonville have been completed.

## EXPENDITURES, SECTION 2, BLACK RIVER CANAL.

## I. ORDINARY REPAIRS.

1. *Superintendent's expenditures for repairs:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....		\$1,266 21	\$1,266 21
Lock-tending .....		5,009 98	5,009 98
Lock-gates .....	\$3,426 51	2,006 49	5,433 00
Aqueducts .....	417 25	77 49	494 74
Waste-weirs .....	70 00	20 12	90 12
Bridges .....	4,029 82	1,275 88	5,305 70
State scows .....	27 00	57 53	84 53
Lock-houses .....	524 00	373 09	897 09
Workshops .....		382 48	382 48
Watch-houses .....	61 15		61 15
Raising and repairing tow- path and berme bank...	1,933 89	2,829 69	4,763 58
Cleaning prism of canal...		2,768 30	2,768 30
Dams .....	359 09	271 00	630 09
Docking .....		192 25	192 25
Breaking ice and assisting boats .....		53 50	53 50
Watching canal .....		914 00	914 00
Tools .....	73 92		73 92
Stop-gate .....	66 00		66 00
Miscellaneous .....		618 19	618 19
	<hr/>	<hr/>	<hr/>
	\$10,988 63	\$18,116 22	\$29,104 85
Clerk hire .....			900 00
Superintendent's salary .....			1,200 00
			<hr/>
			\$31,204 85

2. *Miscellaneous expenditures:*

Woodhull reservoir .....	20,049 66
Keeper of reservoirs, salary .....	500 00
	<hr/>
	\$51,754 51

## II. EXTRAORDINARY REPAIRS.

1. *Drafts on Auditor:*

Bridge at Port Leyden.....	\$1,105 63
Bridge at Boonville.....	1,678 00

2. *Miscellaneous expenditures:*

Sand Lake reservoir.....	5,505 23
Engineering .....	252 00
	<hr/>
	\$8,540 86

## III. AWARDS AND EXPENSES OF AWARDS.

Certificate issued.....	\$5,721 52
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1. *Miscellaneous expenses:*

Engineering, counsel, printing, witness fees, etc .....	3,259 00
	<hr/>
	\$8,980 52

## BLACK RIVER CANAL.

## SECTION No. 3.

FRANK B. JOHNSON, *Superintendent.*

This section extends from Lyon's Falls to Carthage, a distance of forty-two miles, and includes the Black River improvement.

The contract for repairs of this section was let to Israel G. Wood, February 16th, 1869, for four years and ten months, and was subsequently assigned to Ward & McVicker, and was surrendered and canceled April 13th, 1870; since which time this section has been kept in repair by the State, under the direction of the superintendent.

Structures on section: One road bridge at Carthage (iron); one draw-bridge at Illingsworth; one at Beach's; one at Tiffany's; one at Whittlesey's; one lock and dam at Beach's landing; one lock and dam at Otter creek, and a dam at Carthage; two-lock houses; three bridge houses, and five docks.

A new rip rap wall has been built on the side next to the dam, at Otter creek, for the protection of the lock.

The vertical wall at the head of Otter creek lock fell into the river in May last, owing to an imperfect foundation. The stone were removed from the river. It has been partially rebuilt so as to render it safe against high water.

Otter creek and Beach's locks have been repaired so as to render them in good condition for the season.

The bridges on this section require constant care and watchfulness, as with the exception of the Carthage bridge, they have been built

many years. They have been thoroughly repaired, and the draws kept in as good working condition as possible.

Competent lock and bridge-tenders have been employed for the season.

There was a serious break in the dam at Beach's lock, caused by imperfect graveling of the same in August, 1871, which, but for timely attention, would have involved a heavy loss to the State. It has been thoroughly repaired.

The past season has been an unusually dry one; the water averaging lower on this section than in any former season in twenty years. The State dredge has been kept in constant use during the entire season of navigation, and running for twelve hours per day for over ninety days; the balance of the season, ten hours per day. Navigation has been maintained at all times on the entire section.

There has been a State scow built, including derrick, ropes, and chains.

Only one boat was sunk on this section, and that was from carelessness of men running it. The boat was raised, and the cargo, consisting of coal, saved.

The lock-gates at Otter creek are old and very much decayed, and will soon have to be replaced by new ones. New ones should be built and kept in readiness.

At the season of navigation it would be almost impossible to procure the timber as it is very long, heavy, and difficult to obtain.

The road-bridge at Carthage will soon need new floor-timbers. Bents should also be put up to support the arches, and prevent them from swaying. This bridge is an imperfect structure. The draw of Beach's bridge should be rebuilt, the abutments and track leveled up and placed in good running order. The pivot abutment of Whittlesey bridge will soon have to be taken up and relaid, as it is constantly settling, owing to imperfect foundation. New timbers should also be framed for the circle that the wheels rest upon; also the span next to the east shore be raised and the rods shortened.

It has been more difficult to maintain navigation on this section the past season than in 1870, owing to the extreme low water. The channel of the river is constantly changing, owing to the flow of tan-bark and sawdust from streams tributary; the sandy nature of the banks forming bars at the time of spring freshets. The work of dredging should be commenced as early as practicable next season, in order to insure navigation on the entire section before the time of low water.

A riprap wall should also be built on side next to the dam at Beach's lock during low water next season.

The work on Parker's landing bridge has been suspended for want of funds. A further appropriation by the Legislature, or some aid from the towns interested, who procured the passage of the law, will, when the bridge is needed, be necessary to complete the structure. The abutments and piers are nearly completed, and a portion of the materials for the superstructure are piled up on the banks.

## EXPENDITURES, SECTION 3.

### I. ORDINARY REPAIRS.

#### 1. *Superintendent's expenditures for repairs, etc.:*

	Cost of new structures.	Cost of repairs to old struc- tures, etc.	Total.
Locks .....	\$588 30	\$528 95	\$1,117 25
Lock-tending .....		1,045 32	1,045 32
Bridges .....		947 80	947 80
State scows .....	140 00		140 00
Cleaning prism of canal ..		5,007 24	5,007 24
Dams .....		286 00	286 00
Miscellaneous .....		580 86	580 86
	<hr/>	<hr/>	<hr/>
	\$728 30	\$8,396 17	\$9,124 47
Clerk's hire .....			900 00
Superintendent's salary .....			1,200 00
			<hr/>
			<u>\$11,224 47</u>

### II. EXTRAORDINARY REPAIRS.

#### 1. *Drafts on Auditor:*

Parker's landing, bridge .....	\$11,118 00
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#### 2. *Miscellaneous expenditures:*

Engineering .....	260 00
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### III. AWARD OF CANAL BOARD.

Act chapter 613, Laws of 1869 .....	1,570 00
	<hr/>
	<u>\$12,948 00</u>

### GENERAL REMARKS.

With the exception of the delay caused by the Ox Bow break, near Fairport, on the Western Division, soon after the opening the canals, in April last, the season of navigation for 1871 has been a remarkably successful one.

The canals have been kept in good repair, and every necessary facility afforded to assist navigation and encourage business. Confidence has been restored in the use of the canals for the great commercial purposes for which they were designed, by shortening the time of transit and by the certainty and regularity of the movement of freight throughout the entire season.

This confidence, with the beneficial effects of the low toll policy, now approved by both parties, which produces low rates of freight that defy competition to the shipper, while they are remunerative to the boatmen and forwarders, has resulted in a large increase of business upon the canals.

The total tonnage upon all the canals of this State since the close of the war has been as follows:

Years.	Tons.
1865 .....	4,729,654
1866 .....	5,775,220
1867 .....	5,688,325
1868 .....	6,442,225
1869 .....	5,859,080
1870 .....	6,173,769
1871 .....	6,467,888

It will be noticed that the business of 1869, though greater than that of any previous year except 1868, was, owing to the breaks and disasters of that year, less than 6,000,000 tons.

The tonnage of 1870 shows a gain of 314,689 tons over that of 1869.

The total movement of 1871 exceeds that of 1870 by 294,119 tons, and is greater than that of any year in the history of the canals.

The increase in tolls received during the *season of navigation* for 1871, over those of the season of 1870, is \$489,260, while the expenses of repairs and management has been materially reduced.

These gratifying results are due to the policy of low tolls, and the improved condition and management of the canals adopted and brought about during the past two years. The benefits of this policy have not accrued to the State alone. This increase in business has brought into profitable employment the large amount of capital invested in the means of transportation upon the canals, the most of which is owned and operated by the citizens of this State.

Every boat capable of carrying a load has been employed during the past season. Many boats have made seven round trips between Buffalo and New York. Two years ago it required extraordinary energy and good luck to make five, while the average was but little

more than four round trips in the season of navigation. It is estimated by those most familiar with the subject, that, of the five or six thousand boats in use upon the canals, at least three thousand boats have earned a profit over all expenses of from one to two thousand dollars each during the season of 1871.

These profits upon the necessary floating stock of the canals, amounting in the aggregate to several millions of dollars, have accrued and been distributed among those owning and furnishing this equipment, while the people of the State have been equally benefited by cheap freights upon grain, coal, and all the necessities of life.

#### SUPPLY OF WATER.

Great attention has been paid and large sums of money expended, during the last three years, upon the Eastern Division, to secure and increase the supply of water.

From year to year the forests are being cut off, and the lands cleared up and drained. The effect is to dry up the natural reservoirs of water which formerly gave a continuous flow to the streams through the summer season, and to make all the streams more liable to heavy freshets, and more and more subject to long periods of scant supply.

This diminution in the value and efficiency of the feeders used by the State, with the nearly regular increase, since 1865, of the quantity of water required to make the additional number of lockages, has been met by the reconstruction of many of the dams and reservoirs formerly in use, on new and improved plans, and by building and developing new reservoirs and feeders. While this has largely increased the cost, both of ordinary and extraordinary repairs, on many sections of the Eastern Division, during the past three years, all these structures, now being permanently built and in good order, will require but slight expenditures for repairs for many years to come.

## SUPPLY OF WATER FOR ERIE CANAL.

The following reservoirs are now in use :

*Reservoirs on Black River.*

NAMES.	Area of surface acres.	Av'ge area acres.	Depth feet.	Capacity cubic feet.
Woodhull .....	1,236	1,118	18	876,550,000
North Branch, which can be filled twice yearly .....	423	277	28	310,000,000
South Branch .....	518	372	26	421,190,000
Sand Lake (nearly completed), can be filled twice yearly .....	345	306	15	199,879,822
Totals .....	2,522	2,073	.....	1,807,619,822

## FEEDERS NOT NAVIGABLE.

	Miles.
Mohawk river at Rexford Flats .....	0.39
Schoharie creek .....	0.63
Mohawk at Rocky Rift .....	3.92
Mohawk, south side, at Little Falls .....	0.19
Mohawk, north side, at Little Falls, partly navigable... ..	0.50
Mohawk at Rome .....	0.05
Oriskany creek feeder .....	0.62
Total .....	6.30

## WATER USED FOR ERIE CANAL.

Name of feeder.	Cubic feet.	Distance to be supplied in miles.	Quantity furnished in cub. feet per min.
Wood creek at Rome .....	125		
Black River canal .....	1,294		
Mohawk and Black river at Rome, .....	10,000		
Butt's creek .....	1,000		
Oriskany creek .....	4,561		
Chenango canal .....	911		
Total supply for east end of Rome level....	56		17,891
Ilion creek .....	3		800
Mohawk river at Little Falls .....	9		12,643
Mohawk river at Rocky Rift .....	27		10,602
Schoharie creek .....	25		6,800
Mohawk river at Rexford Flats .....	20		10,979
Mohawk river from Cohoes dam .....	11		9,570
	150		69,285



The Mohawk feeder at Rome, fed mainly from the feeder on Black river, has been estimated to furnish 11,776 feet per minute, but the quantity was carefully measured July 26th, 1870, and found to be but 8,500 feet per minute. The dam at Rome has since been repaired, and 10,000 feet is believed to be a correct estimate for the average quantity through the season. Since the sluice at the Cohoes guard-lock was enlarged last spring, a greater amount than was formerly estimated has been used to supply the levels and mills below.

A large portion of the embankment, the bulk-head, pipes and gates and spill-way of Woodhull reservoir were rebuilt on a change of plan in 1870, and completed permanently in 1871.

An appropriation of \$2,500 was made by the Legislature of 1870, to pay the difference in cost between wood and iron pipes for this reservoir, the balance of the cost of reconstruction to be paid from ordinary repairs. Two iron pipes, nearly 100 feet in length, thirty inches inside, diameter, with Ludlow's patent valves, or stop-gates, have been put in by the Commissioner in charge. The pipes have been laid in masonry and cement, with stone well house, wooden head gate, etc., and the whole work done in the most thorough and substantial manner.

This reservoir flows nearly 1,200 acres, and can be filled eighteen feet above the pipes. The expense of reconstruction has been large, but there can be no doubt of the duty of the State in storing this large quantity of water, to take every possible precaution to protect its own property, and that of its citizens below, from the calamity of a Black river flood, and that might exceed, in its terrible consequences, the great freshet of 1869.

About fifteen feet of water was accumulated in the winter and spring of 1871, all of which was consumed by the middle of October, and was indispensable in maintaining navigation on the Erie canal.

The damage caused to the property of the State, by the breaking away of North Branch reservoir, April 21st, 1869, the effects of which gave rise to the well-known *Black river claim cases*, was very large. The work of repairs was undertaken by the repair contractor in the summer and fall of 1869, and nearly completed. This break account amounted to over \$49,000, and the most of the work was upon this reservoir.

The heavy snow in the fall of 1869 prevented the finishing and testing of the new dam then erected. By the superintendent during the next season the dam was strengthened and loaded with several hundred tons of stone, an apron constructed below the sluices, the

gate stems taken out and refitted, new slope wall made on the face of a portion of the embankment, and the new chute or spill-way finished and cleaned out at an aggregate cost of \$3,942.76.

North Branch flows 400 acres, can be raised twenty-eight feet, and filled twice in a year. It is now drawn off for safety, but can be filled by the spring freshets.

At South Branch reservoir, where the upper portion of the well timber has become so decayed as to be worthless and unsafe, the wall and embankment around the well were taken up, the decayed timbers taken out and new put in its stead, the earth and wall replaced, the valves and rods refitted, the well caulked and the whole work put in good condition at an expense of \$1,073.34. South Branch flows about 500 acres, and can be raised twenty-five feet.

#### SAND LAKE RESERVOIR.

Chapter 767 of the Laws of 1870, appropriated \$100,000 "for the supply of additional water on the Rome level." On the recommendation of the commissioner in charge on the 4th of August, 1870, the Canal Board approved the maps, plans and estimates for the construction of Sand lake reservoir.

Sand lake reservoir is situated a short distance from the outlet of Sand lake, about a mile and a half from Woodhull. It is formed by flooding Mud and Sand lakes to a depth of fifteen feet above the surface of Sand lake.

The water to fill this reservoir is obtained from these two lakes, and from the first, second and third Bisby lakes which lie northeasterly from the Woodhull reservoir, the former outlet to which emptied into Black river some distance below that of Sand lake. The plan was to construct a stone dam about 150 feet in length across and connecting two deep gorges in the solid rock, on the outlet of Sand lake, in one of which the discharge pipes are placed, while the other is used for a spill-way.

A dam has been built at the original outlet of the third Bisby lake, and a new channel 1,200 feet long, sixteen feet wide, and averaging two and a half feet in depth, has been excavated, and the water turned through it, so that the waters from third Bisby now run into Sand lake. Another channel 650 feet long, eighteen feet wide, and averaging three feet in depth, has been cut from Mud lake southerly to Sand lake, so that Mud lake can be drawn down when the reservoir is emptied.

The stone dam is complete between the two gorges and nearly so

in the east gorge. Two thirty-inch iron pipes, left over from the Woodhull work, valves, grates, etc., have been inserted in and covered by the masonry, and completed in good order. The gates are hung, work easily, and shut tight. The masonry must be raised to its full height in the spring. In the west gorge the foundation is laid and about seven feet of masonry built up about to the level of the pipes at the other end of the dam. A quantity of stone are quarried, and good quarries opened, sufficient to finish the work on the original plan if desired. Roads have been opened, boats, buildings and shops have been built, and the cement, tools, plank, iron, timber, bolts and other materials are on hand sufficient to complete the work. The extraordinary cold and stormy weather in this region from November 10th to January 1st, made it impracticable to finish the work this year.

When completed, this reservoir will have an

Area of surface.....	344.50` acres`
Average area.....	305.81   “
Depth.....	15.00 feet.

And can be filled twice yearly:

Capacity .....	199,879,822 cubic feet.
Supply for 100 days .....	1,388   “   per minute.

The surface of the water in Sand lake reservoir is thirty-three feet below Woodhull. The elevation above tide-water, 1,796 feet. The survey and plans were made by S. E. Babcock, assistant engineer, aided by Superintendent R. S. Miller, in July, 1871. The work has been done by the commissioner in charge, under the supervision of Superintendent Miller, and C. A. Wider, foreman. It is confidently believed that this reservoir will be a very valuable one; and, with the others, will furnish all the water that can be carried through the feeder from Forest Port to Boonville at its present capacity.

#### ORISKANY FEEDER.

In October, 1871, a new source of supply for the Rome level was added by bringing in the waters of Oriskany creek, seven miles west of Utica.

Attention was called to the availability of this stream as a feeder, before the construction of the Erie canal. In the first report of the Canal Commissioners, De Witt Clinton, Van Rensselaer Young, and Holley, made to the Legislature February 15th, 1817, submitting plans for the Erie canal; a map and estimate of this feeder was included.

Their report says: "By throwing a dam across the Oriskany five feet high, at a point forty-six chains above the line, the water may be brought in a feeder into the canal."

A number of surveys and measurements of the water have since been made with a view to a use of this stream.

It was measured by C. A. Olmstead, assistant engineer, in the extreme dry season in July, 1870, and found to contain 4,500 cubic feet per minute.

Early in the season of 1871, from the increase in business upon the canals, and the unusually low state of the streams and lakes, danger was apprehended of a failure of a supply of water.

It became necessary to commence drawing from the reservoirs at Black river in May, at least a month earlier than ever known before. By the first of July great difficulty was found in keeping up the Rome level, and occasional detentions of a few hours at a time began to occur.

The supply from the feeders and reservoirs on the Middle Division, coming into the Rome level (which extends from Utica to Lodi, fifty-six miles), being limited, proved insufficient to furnish its usual proportion of water for this level. The feeding from the Black river reservoirs was increased to its utmost capacity, and continued at a rate that would exhaust all the reservoirs by the 15th of October. With this, it was found impossible to keep up uninterrupted navigation on this level.

Chapter 196, Laws of 1833, provides that, "whenever the navigation of any of the canals shall be interrupted or endangered, by reason of a deficiency of water, it shall be the duty of the Canal Commissioners, without delay, to supply such deficiency; and, for that purpose, they shall, by themselves or their agents, resume the temporary use of all the surplus waters which shall have been leased upon the level of the canal where such deficiency exists; and in such case, if there shall be a deficiency of water, then they shall have power to enter upon and use all lands, streams and waters, which, in their judgment, may be necessary or proper to be used to procure a temporary supply of water for such canals."

Under this authority, the Board of Canal Commissioners, by resolution, on the 19th day of August, 1871, temporarily appropriated the waters of Oriskany creek, and authorized the construction of a feeder at that point by the Commissioner of the Eastern Division.

To be certain that the supply to be obtained from this source would prove sufficient for the amount of water needed for October and Novem-

ber, a new measurement of the quantity of water in this creek was ordered. The following statement was procured:

Gauge of the Flow of Water in Oriskany Creek, August 23  
AND 24, 1871.

Time of measurements.				Cubic feet per minute.	Total cubic feet.
Aug. 23.	3	P. M. to 6	P. M. ....	5,200	936,000
	6	P. M. to 7	P. M. ....	4,858	291,480
	7	P. M. to 9.30	P. M. ....	4,315	647,220
	9.30	P. M. to 5	A. M., 24th ....	4,044	1,819,800
Aug. 24.	5	A. M. to 7	A. M. ....	3,981	477,720
	7	A. M. to 8	A. M. ....	4,182	250,920
	8	A. M. to 9	A. M. ....	4,673	280,380
	9	A. M. to 10	A. M. ....	5,084	303,040
	10	A. M. to 3	P. M. ....	5,200	1,560,000

Total for twenty-four hours..... 6,568,560

$$\frac{6,568,560}{24 \times 60} = 4,516 \text{ cubic feet per minute.}$$

L. L. NICHOLS, C. P.

Preparations for the work were made, and the construction placed in charge of E. W. Hopkins, Esq., of Little Falls. Work was commenced on the 28th of August, and the feeder was ready for use about the 20th of October. Its cost has been \$32,236.74. A large amount of hard-pan, unexpectedly found in the cutting, required to be blasted. About \$1,000 more will be required to build some farm bridges, and complete the work next spring. When the feeder was brought into use, there was but ten days supply of water left in the Black river reservoirs, and but five days in the principal source of supply for the Middle Division. Rains, later in the fall, replenished the reservoirs, and gave a good supply during the remainder of the season.

The Oriskany feeder was kept in daily use until the close of navigation, and proved to be of great value in keeping up that portion of the level. No further detentions occurred during the season. The increase of tolls over last year, for the season of navigation of 1871, was \$489,260. With an insufficient supply of water and frequent detentions upon this level at this season of the year, no such gains would have accrued.

On the 28th of September the Commissioners of the Canal Fund appropriated \$40,000 for the purpose of defraying the expense of this feeder, from the fund provided by chapter 767, of the Laws of 1870, "for a supply of additional water for the Rome level."

On the 29th of December, 1871, the Canal Board approved and adopted the maps, plans and estimates formerly submitted, and on the same day the Board of Canal Commissioners, by resolution, formally made a permanent appropriation of the lands and waters of Oriskany feeder as constructed, to take effect as of September 1st, 1871, when the actual entry and appropriation for canal purposes was made. The feeder is  $\frac{5.3}{100}$  of a mile in length from the Erie canal to the bulk-head and gates. The dam across the creek is 214 feet in length and eight feet high. The size of prism is twenty-six feet water line, fourteen feet bottom, four feet depth. The base of the feeder is three feet above canal bottom, and the surface water in the dam about two feet above the surface of the canal. The supply of water to be obtained from this feeder will always be largely in excess of the actual flow of Oriskany creek. From Madison pond to Clinton, the Chenango canal is located in the valley of this creek. There is a bountiful supply of water for this canal from the ponds and reservoirs above. The whole leakage of the canal through this valley, together with such further supply as may be passed down from the sources above, flows into Oriskany creek, and through this feeder into the Rome level. The State, therefore, has at all times the power, without further expense, to increase the capacity of this feeder.

The feeder dam at Schoharie creek, although the best dam ever built at this point, proved to be deficient in length of spill-way. The freshets of October, 1869, and of April, 1870, broke over the banks and destroyed large portions of the walls and did great injury to the feeder.

During the past season the dam has been lengthened 160 feet on the west end, and a permanent dock and embankment made from the abutment to the aqueduct. The work has cost more than the appropriation, but the expenditure was thought to be necessary to protect the feeder aqueduct, and the other valuable structures at this point.

The Troy dam across the Hudson river, which is a part of section one, Erie, has been repaired under special appropriations made by the Legislature. Appropriations have been made for the construction of a stone dam, but no work has been done.

The Cohoes dam of stone, twelve feet high, 1,616 feet in length, has been completed after many delays and accidents. Over 4,000 yards of masonry have been carried away by freshets during the progress of the work. Its cost, at contract prices, has been \$220,529.28. The Canal Board, under chapter 543, Laws of 1870, made an extra allow-

ance on work done to May 2d, 1870, of \$16,615. A further claim upon work done since that date is made by the contractor. It is now a complete and permanent structure.

#### SUPPLY OF WATER, FOR CHAMPLAIN CANAL.

From the junction with the Erie canal at West Troy, to a point one mile north of Waterford, a distance of five miles, the supply is from the Mohawk river at Cohoes; from Waterford to Troy dam, a distance of three miles, the communication is by the Hudson river; from one mile north of Waterford to the crossing of the Hudson river, two and a quarter miles south of Fort Miller, a distance of twenty-five miles, the supply is from the Hudson river at Saratoga dam; from that point to Whitehall, a distance of thirty-five miles, the supply is from Glen's Falls feeder and Wood creek. The Glen's Falls feeder is twelve miles in length, including the pond above the dam. The dam is built across the Hudson river one and a half miles above Glen's Falls, about seven miles from the Champlain canal.

It became necessary, in August, 1870, to get an additional supply of water for the Glen's Falls feeder on the Champlain canal, from the lakes and ponds many miles above, whose waters flow into the North and Sacandaga rivers, by which means navigation was kept up nearly two weeks, until rains raised the river to its usual height. This necessity was partially caused by the leaks in the feeder, through the crevices of the limestone through which this portion of the feeder is cut, but principally from the dilapidated condition of the dam at the head of the feeder.

Chapter 877 of the Laws of 1869 made an appropriation of \$25,000 for rebuilding the Glen's Falls feeder dam, the balance of the cost to be paid from ordinary repairs.

E. H. Crocker, division engineer, made a report on its condition January 3d, 1871, in which he says:

"For several years past I have been perfectly familiar with this dam, and have considered it decayed and unsafe. I am of opinion that it is liable to be swept away at any time during a freshet. In his report for 1866, Daniel C. Jenne, Esq., formerly division engineer, calls particular attention to its 'dilapidated condition,' and in his report for 1867 says: 'The dam across the Hudson river at the head of the Glen's Falls feeder, and at Fort Miller, are both in a very dilapidated condition, and are liable to fail at any time.'

"In my report for 1868 attention is also called to its unsafe condition. It should be rebuilt at once. The work should be started, and

so far advanced this winter as to protect the south end, and to complete the north end ready for navigation in the spring."

Under the direction of the Canal Board, the Commissioner in charge commenced the work of rebuilding the dam in January, 1871. Owing to the irregular surface of the slate rock below the old dam, which was worn by the action of the water and logs for many years, the plan provided for the location of the new dam above the edge of the old dam, in an average depth of twenty feet of water, which made the cost of bailing and draining one of the largest items in the work. The most dangerous point was on the south end beyond the wooden abutment, where a break had formerly occurred and had been stopped mostly with lumber.

The south abutment, twenty-seven feet high, thirty-six feet long and wing-wall 147 feet in length, was built upon the rock, and the connection with the old dam made secure before the spring freshets. On the north end a stone pier, twenty-six feet high, thirty-six feet long and wall 100 feet in length, extending to the guard-lock, seventeen feet wide, nine feet high, built for a foundation for the timber bulk-head, and bulk-head was completed, a large amount of slate rock excavated at the head of the guard-lock, vertical wall built, and the water let in before the 15th of April. The coffer-dams for the stone work and dam were built in deep water and averaged twenty feet in width and twenty-five feet in height; nearly 30,000 yards of gravel were used in filling them, one-half of which had to be drawn to the dock and boated. The original plan contemplated using the lower portion of the frame work of the old dam; but on excavation no part of the timber work of the old dam was found to be sound or available for any purpose.

The dam has been thoroughly and substantially built upon the solid rock for its entire length. The stone work consists of a wing-wall 147 feet long, one large abutment, two piers, and foundation for two bulk-heads, each 100 feet long. On the dam between the piers is a crib work of timber twelve to sixteen inches square, twenty-seven feet wide, 618 feet long and from eighteen to twenty feet in height above the rock, securely bolted and filled in with small stone from top to bottom, and covered with a course of eight-inch hemlock, and by another of three-inch hardwood plank. The stone and wood work of the dam was wholly completed December 30th, 1871.

A small amount of graveling and the iron sheathing for a log-way left in the dam, twenty feet in length, two feet deep, and the removal of the last coffer-dam yet remains to be done to complete this important work.



Chapter 877, Laws of 1869, authorized the construction of a stone dam across the Hudson river at Fort Miller bridge (known as Saratoga dam), and appropriated the sum of \$27,000 for that purpose, the balance to be paid from ordinary repairs.

The work was commenced at the south end in Saratoga county. The abutment has been built and the dam completed 376 feet northerly, nearly to the angle of the old dam. This stone dam is fourteen feet base, eight feet coping, and averages twelve and a half feet in height, with a backing of loose stone paved with eighteen-inch quarry stone back to the old dam.

#### SUPPLY OF WATER FOR BLACK RIVER CANAL.

From the junction with the Erie canal at Rome to lock No. 9, seven miles, the supply is from the Delta feeder, taken from Mohawk river; from lock No. 9 to lock No. 34 ten miles, the supply is from Lansing Kill feeder; from lock No. 34 to lock No. 102, seventeen miles, the supply is from the Black River feeder; from lock No. 102 to lock 109, one and a third miles, the supply is from the pond above dam at Lyon's Falls. The river navigation is forty-three miles to Carthage.

The water furnished by the reservoirs is drawn only in the very dry season, and passed down through the natural channels of Black river and Woodhull, about twenty miles each, to the pond above dam, at head of Black river feeder, known as the Forest Port dam, which flows about 150 acres; from thence the necessary quantity is taken into said feeder and passed to the summit level at Boonville. From this point the canal is supplied both ways and the balance, designed for the use of the Erie canal, is passed of by a waste-weir into the Lansing Kill at the south end of the summit, and after a portion is again taken into the canal at lock 34 from the Lansing Kill dam, thence into the Mohawk river, from whence it enters the Erie canal by the feeder at Rome.

#### RECAPITULATION

Of works constructed for the benefit of the supply of water on the Eastern Division; done or paid for, from 1869 to December 30th, 1871:

North and South Branch reservoirs.....	\$54,893	59
Woodhull reservoir, roads, etc.....	26,528	78
Sand lake reservoir.....	21,616	78
Oriskany feeder.....	32,236	74

Schoharie dam.....	\$48,525 49
Rexford's Flats dam, award.....	10,832 40
Rexford's Flats feeder, work.....	2,500 00
Cohoes dam.....	237,144 28
Sluice at Cohoes guard-lock.....	4,274 86
Repairs, Troy dam.....	21,964 00
Glen's Falls feeder dam.....	115,957 98
Sluice at Saratoga guard-lock.....	7,243 79
Saratoga dam (uncompleted).....	34,663 00
	<hr/>
	\$618,381 69
	<hr/>

## REPAIR SYSTEMS.

The improved condition of the canals, and the good navigation enjoyed during the past two years, under the superintendent system, affords a sufficient argument in favor of paying all expenses of lock-tending and general management, and of making the greater part of ordinary repairs directly by the State, and not by contract.

In some cases, where important structures must be rebuilt, or any large item of work done, a saving might sometimes be made by letting the work, but any general system of itemizing and letting the bulk of ordinary repairs, will be found expensive and impracticable.

The present superintendent system is not a perfect one, and should be modified in many matters of form and detail, in reference to the purchase of materials, and the auditing and paying of accounts.

By chapter 55, Laws of 1870, the Canal Board was authorized "to devise the method or system by which the repairs of the canals shall be made and its management conducted."

Under this general authority any changes or modifications of the present system may be made by the Canal Board, from time to time, until a more satisfactory system is reached. But no system can dispense with the valuable services of an officer of character and intelligence, who shall have the special supervision of the repairs and the navigation of the section under his immediate charge, with wide discretion and full powers in sudden emergencies and disasters, and responsible directly to the commissioner in charge for the good management of his section.

All the powers, duties and responsibilities of superintendents of repairs, as now established by law, relating to the general management of the canals, should be retained; but there should be a more direct responsibility to the Commissioner in charge than now exists, and an improved system of keeping the accounts.

In my judgment, the present system should be modified in the following respects:

1. The superintendents should be appointed by the Commissioner in charge, to hold office during his pleasure.

This would make the officer appointed, to a certain extent, independent of local and political influences, and responsible only to the appointing power, the Commissioner, who is held responsible by the public for every detail of management on his whole division. The power should be coupled with the responsibility to secure an efficient management of the canals.

But whatever difference of opinion may exist as to the officer or board by whom the appointment should be made, it is believed that a very great improvement could be made by their appointment for an indefinite period of time, in the same manner as resident and division engineers. This would prevent the annual excitement over appointments, and give the appointing power the opportunity to retain a faithful officer, or to make changes with care and discretion, uninfluenced by political clamor, or the persecutions that sometime follow an officer for the strict discharge of his duty.

2. Superintendents should make their estimates for each month for the work to be done on their section; the amount of which, when approved by the Commissioner, should be advanced to the Commissioner, and by him deposited in the bank selected by him upon that section, which will furnish currency when required. This provision would place the finances of the division in the direct charge of the officer held responsible for the expenditures for ordinary repairs of that division.

3. Stringent regulations should be made that all purchases of materials amounting to over \$100 in value, should be by written contract, on a printed form, to be furnished, which should require the Commissioner's approval, within ten days, to make it valid.

In case of breaks or sudden emergencies, the superintendent to procure materials needed; but the price to be referred to the Commissioner in charge for adjustment.

The agreement should also contain a clause authorizing the Commissioner to modify the quality and quantity to be contracted for.

This is an important provision, and would greatly relieve the superintendent and benefit the State.

4. Direct and require that the superintendent shall forward weekly report of check rolls, duly verified, with prices to be paid, by mail, to the Commissioner's office, made up to Saturday night of each week,

specifying the work on which the labor has been employed, and forwarded invariably by the next Tuesday.

This would give the Commissioner an opportunity to know fully, every week, the amount of work being done on the division, and would make any error or frauds in check rolls easy of detection.

Under the present system the Commissioner never sees a check roll, or has any definite knowledge of the amount of work being done, except from the estimate made in advance, and the abstract containing vouchers and check rolls returned more than two months after.

5. On the first of every month the superintendent and his clerk shall prepare all accounts for settlement, and forward them promptly to the Commissioner for examination and audit.

This is the most important and valuable improvement suggested, and makes a radical change in the system.

The *present method is to examine and audit superintendent's vouchers after he has paid them*, and to certify that the prices in the opinion of the Commissioner are reasonable and just. Any deductions that the Commissioner directs to be made, must come out of the superintendent, and not from the party who furnished the material or done the work. Practically, under the present system, except in case of gross over-charge or extravagance, the examination of the accounts is, to a great extent, confined to their correctness, the authority and legality of the expenditure, and the form and regularity of the papers.

The responsibility of prices and quantities now lies with the superintendent. He may be better informed as to these matters in his own locality, but they should be subject to the inquiry and supervision of the Commissioner before payment.

Any plan that will permit an investigation of accounts by the Commissioner *before they are paid*, will be a great gain to the State over the present method.

6. There should be appointed upon each division a general paymaster and two or three assistant paymasters, who shall give bonds and be subject to the direction of the Commissioner. The general paymaster only to have power to audit and allow accounts in case of the absence of the Commissioner.

7. The Commissioner or his general paymaster shall examine these accounts promptly, and mark each item "Pay," "Suspend," or "Disallow."

8. Upon the accounts as audited and allowed, the paymasters shall proceed at once to the sections to which they may be assigned, go over each section and pay as directed, from funds drawn by check

from the bank upon that section, to the persons named in the vouchers ; such payments to be made in the presence of the superintendent of the section, or his clerk ; or, in case of their necessary absence, before a justice of the peace, who shall certify to their presence at such payment. Certain advances may be made by the Commissioner to the superintendent, for paying accounts less than \$100, and for advances necessary to be made for labor during the month, all of which must be settled and adjusted by the paymaster before leaving the section. On leaving, the balance of funds on hand for that section, to be redeposited, and the accounts and vouchers forwarded to the Commissioner.

9. By the 20th of every month the accounts and vouchers for all the sections to be certified to as correct by the Commissioner and delivered over to the Auditor, who shall audit them within ten days.

Experience might suggest many modifications and improvements upon this system suggested, but it is founded upon sound business principles, and would result in a greater efficiency and economy in the management of the canals.

The expenditures of superintendents on the Eastern Division have been over \$80,000 less than for the fiscal year ending in 1870.

The total cost of ordinary repairs for the past fiscal year on the Eastern Division, including work on dams and locks chargeable to ordinary repairs, is \$724,388.46, being \$498,166 less than in 1870, as will more fully appear by the tables annexed.

#### EXTRAORDINARY REPAIRS.

Most of the work deemed necessary to be done during the coming year, as extraordinary repairs, for which appropriations are asked, has been specified in the preceding statements for each section.

On the Erie canal, the removal of the wall bench, with the construction of new slope and vertical walls and pavement on the tow-path side, is the most important duty yet to be performed, to secure better navigation and to complete the plan of the Erie enlargement.

There is still remaining on the Eastern Division, not under contract for removal, nearly thirty-six miles of old wall bench on the tow-path side, located as follows :

From Wood creek to Newville, through Rome.....	2.50	miles.
“ Utica to Little Falls .....	12.00	“
“ Little Falls to Sprakers .....	15.50	“
“ Fultonville to lock 23.....	5.80	“
	<hr/>	
	35.80	“
	<hr/>	

A further appropriation of at least \$100,000 is necessary for the prosecution of the work now in progress, and for new work of this kind at points where it is most needed.

The following statement shows the tax imposed for canal purposes for all the canals of this State by the Legislature, for new work, extraordinary repairs and awards, from 1866 to 1871, inclusive :

1866, $\frac{1}{8}$ mill.....	\$1,435,527 78
1867, $\frac{3}{8}$ mill.....	1,375,388 87
1868, $1\frac{1}{4}$ mills.....	1,865,714 68
1869, $\frac{1}{4}$ mill.....	1,627,605 67
1870, $\frac{1}{8}$ mill, canal fund.....	245,875 14
1870, $\frac{1}{8}$ mill, deficiency of 1868 and 1869.....	1,721,026 01
1870, 1 mill, new work, etc.....	1,967,001 18
1870, $\frac{1}{8}$ mill, Champlain canal— $2\frac{1}{8}$ mills.....	25,089 75
1871, $\frac{1}{10}$ mill.....	1,351,254 11

The tax for 1871 is less than two-thirds of a mill, and the least in amount of any of the years above named.

The expenditures for extraordinary repairs on the Eastern Division for the past fiscal year have been \$498,096.86.

#### CHAMPLAIN CANAL ENLARGEMENT.

Chapter 788 of the Laws of 1870, provided for a tax of \$25,000, to be levied in 1870, and of \$400,000, to be levied in 1871, for the purpose of the enlargement of the Champlain canal. It is therein directed that "the said sum of \$425,000, the proceeds of said tax, shall be applied and expended for and toward the enlargement of the Champlain canal, in such manner as to give throughout the entire length of such canal, a uniform depth of seven feet of water, and width of forty-four feet on the bottom, and fifty-eight feet at water surface, except as in the opinion of the Canal Board may be required for business purposes, when in that case, the walls may be made vertical, but retaining the same depth of water and width at water surface, and no part of the said appropriation, shall be applied on or for any other object or purpose until the above enlargement shall be made and completed."

It also provides that "on the revision, approval and adoption by the Canal Board of the maps, plans and estimates as provided by section 3 of this act, the Canal Commissioners shall from time to time advertise and let to the lowest bidder so much of said work as may be ordered by the Canal Board."

Under the authority of this law, all the improvement contracts on this canal have been canceled, and final accounts made up and

approved by the State Engineer and Surveyor, for which certificates have been issued.

On the 27th of September, 1871, in the Canal Board, Mr. Chapman presented the maps, plans and estimates for Champlain canal enlargement, and offered the following resolution :

*Resolved*, That the surveys, maps, plans and estimates for the enlargement of the Champlain canal, under the provisions of chapter 788, Laws of 1870, this day submitted, having been ordered and approved by the State Engineer and Surveyor as provided by the law, the same are hereby approved and adopted by the Canal Board, as a proper line and plan of enlargement, to be used whenever any portion of such enlargement is deemed necessary and is ordered by the Canal Board, but that no part of the lands included in said enlargement lines, not now belonging to the State are to be deemed appropriated for canal purposes, until the same are specially ordered and directed to be appropriated according to law," which resolution was adopted.

The Canal Board have full power to direct the expenditures of this appropriation at those points, where the work is most needed for improving the navigation of this canal.

Respectfully submitted.

GEORGE W. CHAPMAN,

*Canal Commissioner.*

ALBANY, December 30th, 1871.

### ORDINARY REPAIRS.

*STATEMENT showing the amounts expended by superintendents of repairs, and by Commissioner by drafts on Auditor upon contracts of all kinds, and from miscellaneous accounts, that are chargeable to ordinary repairs, upon each section of the Eastern Division for the fiscal year ending September 30, 1871.*

CANAL AND SECTION.	By superintendents.	By drafts on auditor.	From miscellaneous.	Total for fiscal year.
<b>ERIE.</b>				
Section 1.....	\$1,348 21	\$206,002 17	\$9,339 98	\$216,590 36
" 2.....	43,160 96		845 83	43,506 79
" 3.....	62,259 56		64 03	62,323 59
" 4.....	51,200 24		1,282 00	52,482 24
" 5.....	42,244 23		916 76	43,160 99
<b>CHAMPLAIN.</b>				
Section 1.....	49,150 29	45,290 98	6,056 98	100,498 25
" 2.....	52,463 57		2,339 86	73,803 43
" 3.....	34,255 08			34,255 08
<b>BLACK RIVER.</b>				
Section 1.....	34,837 82			34,837 82
" 2.....	31,204 86		20,549 66	51,754 51
" 3.....	11,224 47			11,224 47
	\$413,249 08	\$251,293 15	\$59,846 08	\$724,388 31

*COMPARATIVE STATEMENT of expenditures on each section of the Eastern Division, chargeable to ordinary repairs for the fiscal years ending September 30, 1870 and 1871.*

CANAL AND SECTION.		Expenditures 1870.	Expenditures 1871.
<b>ERIE CANAL.</b>			
Section 1	.....	\$206,587 76	\$216,590 36
" 2	.....	122,346 88	43,506 78
" 3	.....	183,792 25	62,323 59
" 4	.....	79,289 15	52,433 23
" 5	.....	70,433 34	43,160 99
<b>CHAMPLAIN.</b>			
Section 1	.....	162,968 14	100,498 20
" 2	.....	116,540 88	78,808 43
" 3	.....	58,054 86	34,255 06
<b>BLACK RIVER.</b>			
Section 1	.....	76,651 25	34,837 32
" 2	.....	112,887 77	51,754 51
" 2	.....	20,982 69	11,224 47
		<b>\$1,222,554 47</b>	<b>\$794,388 46</b>
Decrease in expenses for 1871.....			<b>\$498,166 01</b>

*STATEMENT of all expenditures for new work and extraordinary repairs, directed by the Legislature, upon the Eastern Division for the fiscal year ending September 30, 1871, including \$29,663, certificates given for final accounts for improvement contracts on section 3 Champlain canal.*

Erie canal, section 1.....	\$140,108 46
" " 2.....	18,153 17
" " 3.....	35,266 50
" " 4.....	54,149 24
" " 5.....	21,394 26
Champlain canal, section 1.....	81,062 81
" " 2.....	63,386 39
" " 3.....	54,329 30
Black River, section 1.....	8,757 87
" " 2.....	8,540 86
" " 3.....	12,948 00
	<b>\$498,096 86</b>



*STATEMENT showing the amount of payments made during the fiscal year ending September 30, 1871, for the different items of new work done, exclusive of engineering expenses, on the Eastern Division of the New York State Canals, by contract and by the commissioner in charge, authorized by the Canal Board and chargeable to extraordinary and ordinary repairs.*

## EXTRAORDINARY REPAIRS—ERIE CANAL.

CHARACTER OF WORK.	Amount paid during the fiscal year.	Total amount paid to Sept. 30, 1871.	Remarks.
<b>BY CONTRACT, LAWS OF 1868.</b>			
Rebuilding lock No. 2 .....	.....	\$1,224 00	.....
Removing wall bench, etc., from lock No. 2 to Port Schuyler (error in amount) .....	\$958 60	58,843 25	Closed.
Raising and repairing Troy dam .....	3,791 18	21,964 18	Closed.
Wall bench and 800 feet docking, Rome .....	1,119 11	3,694 11	Closed.
<b>LAWS OF 1869.</b>			
Iron bridge, Oneida street, Cohoes .....	2,262 71	6,155 71	Closed.
Sluice at Cohoes guard-lock .....	4,274 86	4,274 86	Closed.
Lower lock, upper side-cut, West Troy .....	3,451 00	3,451 00	.....
Upper lock, upper side-cut, West Troy .....	884 00	884 00	.....
Iron sidewalk bridge, Cohoes (Summit street) .....	.....	340 00	.....
Removing wall bench, etc., from Port Schuyler to Lower Mohawk aqueduct .....	99,943 00	157,505 00	.....
Stone dam, sloop-lock, Troy .....	.....	.....	.....
Wall bench, Lower Mohawk aqueduct to lock No. 20 .....	9,724 00	15,759 00	.....
Wooden bridge at Ilion .....	578 00	4,454 00	.....
Iron foot bridge at Utica .....	1,483 15	2,608 15	Closed.
Wall bench and vertical wall, Utica .....	2,448 00	2,448 00	.....
Wall bench, etc., lock No. 43 to No. 45 .....	23,154 00	58,616 00	.....
Wall bench and vertical wall, Utica .....	.....	9,503 00	.....
Wooden bridge (iron chord) Thomas street, Rome .....	.....	.....	.....
<b>LAWS OF 1870.</b>			
Iron bridge, south end Lower Mohawk aqueduct .....	1,452 82	3,201 82	Closed.
Iron bridge, Fonda street, Schenectady .....	2,306 50	2,306 50	Closed.
Wall bench, etc., Canajoharie to Fort Plain .....	14,603 00	14,603 00	.....
Wall bench, etc., lock No. 40 to No. 41 .....	15,885 00	15,885 00	.....
Wall bench, etc., lock No. 41 to No. 43 .....	.....	.....	.....
Lengthening culvert at Frankfort .....	817 86	817 86	Closed.
Iron bridge at Ilion .....	4,114 96	4,114 96	Closed.
Iron bridge, Schuyler street, Utica .....	1,700 00	1,700 00	.....
Removing slope and bench wall and constructing 1,140 feet vertical wall, berme bank, Rome .....	7,580 43	7,580 43	Closed.
Waste-weir and improving Dry river, West Troy .....	5,404 86	5,404 86	Closed.
Lengthening Schoharie creek dam .....	17,799 00	17,799 00	.....
Iron bridge, lock No. 18 .....	4,807 20	4,807 20	Closed.
Wall bench, etc., berme bank, Utica .....	1,394 46	3,832 46	Closed.
Improvement bridge basin and bridge, Utica .....	.....	.....	.....
Bridge abutment, Spraker's basin .....	.....	.....	.....
Wrought-iron change bridge, West Troy .....	.....	.....	.....
<b>LAWS OF 1871.</b>			
One thousand feet vertical wall, eastward from the guard-lock, Utica .....	.....	.....	.....
Eleven hundred feet vertical wall, Rome .....	.....	.....	.....
Wall bench, etc., from lock No. 42 to No. 43 .....	.....	.....	.....
Wall bench, etc., for 800 feet in West Utica .....	.....	.....	.....
Utilizing feed water, lock No. 37 .....	2,986 00	2,986 00	.....
<b>WORK DONE BY COMMISSIONER.</b>			
Removing rock, bottom Finck's basin .....	2,923 19	2,923 19	.....
Improvement head lock No. 39, Little Falls .....	1,379 15	1,379 15	Closed.
Vertical wall, Little Falls .....	200 00	200 00	Closed.
Oriskany feeder .....	2,630 71	2,630 71	.....
Two farm bridges and ditch, adjacent to Rocky Rift feeder .....	996 91	996 91	Closed.
Widening White-street bridge abutment, Cohoes .....	586 48	586 48	Closed.
Removing wall bench, etc., from lock No. 20 to a point one mile above Upper Mohawk aqueduct .....	3,750 67	24,928 91	Closed.

*Extraordinary Repairs—(Continued).*

## CHAMPLAIN CANAL.

CHARACTER OF WORK.	Amount paid during the fiscal year.	Total amount paid to Sept. 30, 1871.	Remarks.
Dredging Whitehall basin.....	\$11,101 00	\$27,251 00	.....
Laws of 1870.			
Saratoga dam (at Fort Miller bridge).....	16,660 00	16,660 00	.....
Flynn's lock (excess over the old plan).....	17,000 00	.....	.....
Vertical wall and stop gate, Fort Edward.....	1,521 60	9,749 80	Closed.
Vertical wall, Sandy Hill.....	14,178 00	14,178 00	.....
Dam head of Glen's Falls feeder (excess over the old plan).....	25,000 00	.....	.....
Wrought-iron bridge, Fort Edward.....	5,049 00	5,049 00	.....
Vertical wall, waterford.....	6,970 00	6,970 00	.....
Enlargement, Saratoga guard-lock to Bullard's Bend.....	.....	.....	.....
Constructing two locks and section work (in place of three locks) north of Waterford.....	.....	.....	.....
Iron bridge, Fort Ann.....	2,423 00	2,423 00	Closed.
WORK DONE BY CANAL COMMISSIONER.			
Stop-gates, foot of Glen's Falls feeder.....	1,887 74	1,887 74	Closed.

## IMPROVEMENT CHAMPLAIN CANAL.

WORK LET BY CANAL COMMISSIONERS, UNDER CHAPTER 186, LAWS OF 1864.			
From Saratoga lock to Fort Miller lock.....	\$408 00	\$5,797 00	.....
From Fort Miller lock to Moses Kill lock.....	442 00	14,042 00	.....
From Moses Kill lock to Fort Edward lock.....	2,624 00	79,868 00	.....
Section No. 2, twelve mile level.....	14,107 89	55,927 89	Closed.
Section No. 3, twelve mile level.....	16,471 26	62,847 26	Closed.
CHAPTER 877, LAWS OF 1869.			
Whitehall level.....	5,084 90	22,118 90	Closed.
Laws of 1870.			
Flynn's lock, chargeable to repairs.....	22,185 00	22,185 00	.....

## EXTRAORDINARY REPAIRS—BLACK RIVER CANAL.

WORK LET BY CANAL BOARD, UNDER CHAPTER 579, LAWS OF 1869.			
Improvement first level, Rome.....	\$8,998 92	\$6,764 92	Closed.
WORK LET BY CANAL COMMISSIONERS, LAWS 1869.			
Bridge at Parker's Landing.....	11,118 00	17,816 00	.....
Bridge at Port Leyden.....	1,105 63	1,105 63	Closed.
Iron road bridge, Floyd street, Rome.....	2,040 00	3,655 00	.....
Laws of 1870.			
Iron bridge, Dominick street, Rome.....	2,673 20	2,673 20	Closed.
Iron bridge at Boonville.....	1,678 00	1,678 00	Closed.
Laws of 1871.			
Iron bridge at Boonville.....	.....	.....	.....
WORK DONE BY CANAL COMMISSIONER.			
Sandlake reservoir.....	5,505 23	5,505 23	.....

## ORDINARY REPAIRS, EASTERN DIVISION—ERIE CANAL.

Stone dam, Cohoes.....	\$69,009 00	\$45,588 00	.....
CHAMPLAIN CANAL.			
Saratoga dam, at Fort Miller bridge, chargeable to repairs.....	.....	.....	.....
Hewitt's lock, chargeable to repairs.....	7,894 99	23,959 99	Closed.
Flynn's lock, chargeable to repairs.....	22,185 00	22,185 00	.....
Glen's Falls feeder, guard lock, chargeable to repairs.....	6,752 35	23,985 35	Closed.
Dam head of Glen's Falls feeder, chargeable to repairs.....	20,705 91	20,705 91	.....
Becker's lock, award Canal Board.....	7,493 49	.....	.....
BLACK RIVER CANAL.			
Rebuilding Woodhull reservoir.....	20,049 66	20,381 96	Closed.

## LIST OF CERTIFICATES

*Issued for Awards of the Canal Appraisers on the Eastern Division during the fiscal year ending 30th September, 1871.*

DATE.	To whom given.	ACCOUNT OF WHAT CANAL.	
		Erie.	Champlain.
1871.			
February 10	Benjamin Benson		\$2,337 99
June 8	George Northup		5,417 19
June 16	Rensselaer and Saratoga Railroad Company		6,098 65
June 19	Leonard Weller		134 70
June 22	George Harvey		388 51
June 22	George Harvey		567 01
June 22	George Harvey		413 73
June 22	George Harvey		305 51
June 23	James Qillinan		2,010 00
June 23	Thomas Murray		2,010 00
July 14	David C. Brislin		759 25
July 18	James McKee		306 90
September 4	James Johnston		300 95
September 4	John C. Blasdell		1,318 27
September 4	John C. Blasdell		726 97
September 4	Aaron White		1,019 55
September 4	W. S. Alden		52 78
September 4	Thomas Ash		267 86
September 4	George Ashley		309 19
September 4	Nancy Ashley		234 71
September 4	Franklin Bailey		125 37
September 4	Harden Bailey		240 72
September 4	Foster Barker		170 50
September 4	Stuart Barrett		185 95
September 4	John Breason		304 96
September 4	J. H. Brongham		291 55
September 4	Edward Gay		281 49
September 4	Edward Gay		233 34
September 4	John Graham		153 57
September 4	Daniel Guerrin		51 89
September 4	Schimuel Griffin		571 71
September 4	James Guerrin		376 92
September 4	James Guerrin		349 87
September 4	Mary H. Hagen		78 17
September 4	Samuel H. Hardin		169 25
September 4	George Harford		337 63
September 4	Joseph H. Harris		36 93
September 4	Nathaniel Harris		57 08
September 4	David Harvey		209 99
September 4	Charles T. Wright		433 01
September 4	Robert Wiggins		435 67
September 4	Robert Wiggins		559 80
September 4	Thomas Ash		389 28
September 4	Thomas Ash		26 40
September 4	George Ashley		100 00
September 4	Daniel Guerrin		488 95
September 4	Daniel Guerrin		303 44
September 4	George Harford		167 35
September 4	David Harvey		185 37
September 4	David Harvey		125 06
September 4	William Coleman		161 47
September 4	William Coleman		476 42
September 4	Allen Coughdon		81 77
September 4	Allen Coughdon		28 50
September 4	Timothy Crowley		338 92
September 4	Timothy Crowley		23 50
September 4	Fergus Curley		184 45
September 4	Fergus Curley		184 45
September 4	Asahel P. Dewey		319 70
September 4	Horace Dibble		452 52
September 4	Byron Dodge		147 20
September 4	George F. Dudley		269 55
September 4	Fort Edward Water-works Company		908 05
September 4	Thomas Gallagher		283 09
September 4	Thomas Gallagher		376 18
September 4	Mary Henry		592 38
September 4	Mary Henry		502 63
September 4	William Henry		396 52
September 4	E. P. Huestes		62 68
September 4	Jane Huestes		58 31

## Statement of Awards—(Continued).

DATE.	To whom given.	ACCOUNT OF WHAT CANAL.	
		Erie.	Champlain.
1871.			
September 4.....	Alexander Kincaid .....		\$662 60
September 4.....	Peter Lawson.....		174 93
September 4.....	Peter Lawson.....		449 25
September 4.....	William T. Mannis & Co.....		574 95
September 4.....	John P. Mattison.....		158 11
September 4.....	Patrick McIntyre.....		197 36
September 4.....	Patrick McKinney.....		77 16
September 4.....	Jeremiah F. Miller.....		125 37
September 4.....	John Miller.....		730 90
September 4.....	John Miller.....		128 93
September 4.....	Nelson Miller.....		579 00
September 4.....	Nelson Miller.....		39 53
September 4.....	Sidney B. Miller.....		197 90
September 4.....	Andrew Minton.....		196 39
September 4.....	Andrew Minton.....		36 93
September 4.....	Geo. W. L. Smith.....		
September 4.....	W. B. Northup.....		587 06
September 4.....	Charles Moore.....		236 74
September 4.....	Joseph C. Moore.....		470 08
September 4.....	Robert Nichols, Jr.....		75 22
September 4.....	Reuben C. Ostman.....		145 78
September 4.....	James O'Brien.....		784 83
September 4.....	Joseph Potvin.....		307 16
September 4.....	Abiel West.....		63 41
September 4.....	Leander R. Waite.....		218 25
September 4.....	Timothy Buckley.....		197 55
September 4.....	Timothy Buckley.....		198 73
September 4.....	John Burns.....		134 11
September 4.....	Henry Brown.....		125 37
September 4.....	Rhoda Butterfield, executrix, etc.....		840 95
September 4.....	Campbell & Thompson.....		141 03
September 4.....	Erskine G. Clark.....		1,205 47
September 4.....	Fanny E. Carleton, administratrix.....		415 44
September 4.....	Nicholas M. Catlin.....		334 65
September 4.....	Nicholas M. Catlin.....		23 21
September 4.....	Joseph Potvin.....		255 69
September 4.....	Thomas Riley.....		69 97
September 4.....	Susan A. Rogers and A. Parker.....		298 77
September 4.....	Jerome H. Smaley.....		30 68
September 4.....	James Stack.....		250 74
September 4.....	Ezekiel Smith.....		202 64
September 4.....	Ezekiel Smith.....		564 64
September 4.....	Charles C. Smith.....		497 22
September 4.....	Timothy Sullivan.....		109 04
September 4.....	James Toole.....		323 33
September 4.....	Bloomer Underhill.....		334 89
September 4.....	Bloomer Underhill.....		31 66
September 4.....	George A. Underhill.....		84 61
September 4.....	George A. Underhill.....		77 25
September 4.....	Charles T. Wright.....		564 15
February 10.....	Nancy Morrison.....	\$1,769 41	
February 10.....	Michael Mann.....	932 58	
February 10.....	Patrick Tully.....	1,272 94	
February 10.....	Margaret Sheehan.....	1,129 30	
February 10.....	H. I. Seymour.....	1,629 60	
February 10.....	Lawrence Shaughnessy.....	1,162 61	
February 11.....	Michael Stoven.....	1,764 10	
February 11.....	Charles Conroy.....	655 35	
		\$10,315 89	\$52,654 04

Statement of awards and expenses of awards of canal appraisers, paid on the Eastern Division during the fiscal year ending Sept. 30th, 1871 :

Erie canal, section 1.....	\$1,534 50
Erie canal, section 2.....	1,003 50
Erie canal, section 5.....	340 00
Champlain canal, section 1.....	300 00
Champlain canal, section 3.....	62 40
Black River canal, section 2.....	3,259 00
	<hr/>
	\$6,499 40
	<hr/>

Amount of certificates issued for awards of canal appraisers on the Eastern Division during the fiscal year :

Erie canal .....	\$10,315 89
Champlain canal.....	52,654 04
Black River canal.....	5,721 52
	<hr/>
	\$68,691 45
	<hr/>

Comparative statement of expenditures of all kinds, including certificates given, upon the Eastern Division, for the fiscal years ending Sept. 30th, 1870 and 1871 :

	1870.	1871.
Ordinary repairs.....	\$1,222,554 47	\$724,388 46
Extraordinary repairs .....	569,466 98	498,096 86
Awards Canal Board .....	40,562 77	Included above.
Awards, etc .....	64,597 14	6,499 40
Certificates for awards .....	.....	68,691 45
	<hr/>	<hr/>
	\$1,897,181 36	\$1,297,676 17
	<hr/>	<hr/>

Decrease in total expenditures for 1871, \$599,505.19.

## MIDDLE DIVISION.

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The Commissioner having charge of the Middle Division respectfully submits his annual report.

The statistics embrace expenditures for the fiscal year ending Sept. 30th, 1871, while in some cases his observations and suggestions are based on subsequent experience and events to March 1st, 1872.

The expenditures on this division for all purposes, embracing ordinary and extraordinary repairs, for work authorized by the Legislature and Canal Board, for salaries and miscellaneous, and payments of awards made by the Canal Appraisers for land damages, compare as follows with those of the preceding fiscal year:

1870 .....	\$1,616,306 30
1871 .....	1,166,871 11
Showing a reduction of .....	<u>\$449,935 19</u>

A detailed statement of such expenditures on the several superintendents' sections is herewith presented.

### *STATEMENT giving the description of sections and expenditures thereon during the fiscal year.*

#### ERIE CANAL.

The Middle Division of the Erie canal extends from the eastern bank of the Oneida Lake canal to the east line of Wayne county, seventy-two miles, and comprises three repair sections, as follows:

##### REPAIR SECTION No. 7.

SEYMOUR HARVEY, *Superintendent.*

This section embraces twenty-seven miles of the Erie canal, extending from the east bank of Oneida lake canal to the Limestone creek feeder; the Oneida creek feeder, two miles in length, navigable from Durhamville to Oneida, a distance of one mile; and the Erieville and Cazenovia lake reservoirs and Chittenango feeder. Total,

twenty-nine miles. The structures are: two aqueducts; twenty three culverts; one wooden lift lock (Oneida feeder); five iron bridges: three wooden farm bridges; fifteen wooden road bridges; one guard gate (Oneida feeder); three waste-weirs; three feeder dams; two guard gates.

This section was under contract for annual repairs with Clark Snook, as assignee of William Austin, until April 1st, 1870, when the contractor petitioned the Canal Board for the abrogation of the same, which was granted; since that time the repairs and management of the section have been under the immediate control of the superintendent in charge.

The expenditures upon this section during the last fiscal year were as follows:

#### ORDINARY REPAIRS.\*

##### *By superintendent:*

Repairs of aqueducts, waste-weirs and culverts.....	\$1,000 00
Repairs and construction of bridges.....	2,999 63
Raising tow-path.....	2,473 92
Clearing out bottom and clearing creeks.....	1,027 09
Docking, slope wall, etc.....	182 70
Salaries and miscellaneous.....	2,538 12
Repairs by Superintendent Frederick.....	5,800 00
	<hr/>
	\$16,021 46

##### *By Commissioner, viz.:*

Protecting banks with brush and stone.....	\$5,367 60
Damages, temporary occupation of land.....	333 00
Bridge commutation, Orville feeder.....	1,500 00
	<hr/>

7,200 60

##### *Work ordered by Legislature or Canal Board:*

Inserting iron needle beams in bridge at Chittenango .....	\$1,078 53
Straightening channel of Chittenango creek, Swing-bridge at Higginsville.....	2,374 40
Changing Cowasselon culvert to an aqueduct, Inserting iron needle beams in bridges.....	755 87
Oneida village bridge.....	3,671 21
	2,039 47
	1,041 65
	<hr/>

10,961 13

Total on section..... \$34,183 19

\* E. T. Frederick had charge of this section as superintendent, from October 1st, 1870, to January 31st, 1871, and from whom no annual detailed report of expenditures during such period has been received.

The condition of the canal banks at Pool's brook (where occurred the unfortunate break in the fall of 1869), and in the vicinity thereof, rendered it prudent, if not imperative, that they should be protected and strengthened with brush and stone, to prevent beyond possibility the recurrence of such a disaster. This work was done under contract, at the expense stated in the above table.

## REPAIR SECTION No. 8.

AARON SCOUTEN, *Superintendent*, AARON G. FISH, *Repair Contractor*. Contract expires January 1, 1874.

This section extends from Limestone creek feeder to lock 50, above Geddes, including Limestone and Butternut feeders, each navigable one mile; total, thirteen miles. The structures are: Three double stone lift locks; two aqueducts; four culverts; one weigh-lock; one wooden farm bridge; three wooden feeder bridges; one wooden towing-path bridge; nine wooden road bridges; two iron tow-path bridges; nine iron road bridges; one iron foot bridge; one feeder dam; one waste-weir; three lock-houses; one State shop.

The expenditures upon this section during the fiscal year were as follows:

## ORDINARY REPAIRS.

Compensation of repair contractor.....	\$18,000 00
Superintendent's salary .....	1,000 00
Salaries of patrolmen .....	400 00
Land damages, temporary occupation .....	744 00
Repairs Syracuse weigh-lock.....	239 80
Repairs Syracuse weigh-lock, building.....	328 07
Land damages, De Ruyter reservoir .....	77 27
	<hr/>
	\$20,789 14

*Work authorized by Legislature or Canal Board:*

Protecting highway at De Ruyter reservoir .....	\$1,887 00
Raising and strengthening the banks near lock 50 .....	5,066 00
Removing wall benches on long level ...	1,122 00
Filling packet-boat basin at Syracuse....	1,139 00
Iron bridge at Warren street, Syracuse..	9,010 00
Iron bridge at Lock street, Syracuse ....	918 00
Removing wall benches, Syracuse level..	16,453 77
Raising road from Geddes to Salina ....	476 00
Vertical wall near Cuykendall's bridge ..	1,235 54
Bridge over Orville feeder.....	288 90



Bottoming down portion of long level...	\$408 80	.....
Culvert near Burdick's bridge.....	813 82	.....
Vertical wall near lock 49.....	1,413 57	.....
Iron bridge at Orville.....	442 00	.....
	<hr/>	\$40,674 40
Total on section.....		<hr/> <hr/> \$61,463 54

No material expense, other than as directed by the Legislature or Canal Board, has been incurred on this section, beyond the annual compensation to repair contractor; and while the rate paid under his contract is moderate, even low as compared with the cost under superintendents, it is due to him to admit that he has kept his section in very fair order, and so vigilantly watched the banks and structures, and attended so well to the passage of boats, that no detention has occurred.

Since the close of navigation it has been determined to take up the tow-path locks Nos. 47 and 48, making them two feet wider, and inserting tumble gates at the head; also, if not found too expensive, incorporating other improvements, under the patent of Mr. Heath. Provision for this work is made in chapter 767, Laws of 1870.

#### REPAIR SECTION No. 9.

T. H. HOUGHTALING \*, and S. D. KELLER, *Superintendents*.

This section extends from the foot of lock 50 to the east line of Wayne county, embracing the Skaneateles lake and feeder, Otisco lake and Camillus feeder, navigable one mile; total, thirty-five miles.

The structures are: Three double stone lift locks; six aqueducts; two waste-weirs; six culverts; one wooden change bridge; eleven wooden road bridges; six wooden farm bridges; eleven iron road bridges; one iron foot bridge; two guard gates; four feeder dams; three receivers.

This section was under contract for annual repairs with S. D. Keller, assignee of Scovil, Eaton and Mowry, assignees of Amos W. Chase, until April 10th, 1870; when the Canal Board was petitioned in due form for the abrogation of said contracts, which was granted. Since that period the repairs and general management of the section have been conducted by the superintendent in charge.

\* Deceased.

## ORDINARY REPAIRS.

*By Superintendent :*

Repairs of locks, and lock-tending.....	\$4,651 59	
Putting in new lock-gates, and repairs, etc.	2,100 81	
Repairs of aqueducts .....	7,125 69	
Reconstruction and repairs of bridges...	9,996 10	
State scow, furniture and repairs .....	1,907 93	
Raising and repairing the banks .....	12,820 55	
Cleaning out canal, creeks and feeders ..	1,073 82	
Repairing dams, docking and slope wall..	540 75	
Repairing breaches.....	540 96	
Ditching .....	1,033 00	
Salaries, superintendent, clerk and watchmen .....	3,542 19	
Expenses of workshop, tools and miscellaneous .....	5,696 91	
		\$51,030 30

*By Commissioner :*

Salaries of patrolmen.....	\$400 00	
Culvert at Port Byron.....	1,622 46	
Survey flow-lines, Owasco lake.....	938 25	
Survey foot of Cayuga lake .....	72 75	
Expenses State tug.....	247 00	
Land damages, temporary occupation ...	150 00	
Tools transferred to State by late repair contractor .....	6,629 95	
		10,060 41

*Work authorized by Legislature or Canal Board :*

Constructing Otisco lake reservoir.....	\$2,091 00	
Improvement Owasco lake outlet.....	5,496 45	
Removing wall benches, Jordan level...	31,501 00	
Inserting iron needle beams in bridge at Centreport.....	1,079 26	
Road bridges.....	544 00	
Slope wall on nine mile creek feeder....	272 00	
		40,983 71

Total on section ..... \$102,074 42

The following expenditures are charged to account for general management of the Middle Division of the Erie canal :

Commissioner's salary and mileage .....	\$2,400 00
Salary and incidental expenses of division and resident engineers .....	8,500 00
Salaries of division agents and Commissioner's clerk..	8,244 33
Salaries of assistant engineers and inspectors .....	9,456 50

Legal agents, services before Canal Appraisers .....	\$1,290 65
Stationery, postage, telegraphing, printing, etc.....	2,181 66
Repairs and running expenses State dredge.....	6,230 05
	<hr/>
	\$38,303 19

The numerous wooden structures on this section (aqueducts and bridges) had about survived the ordinary life of such perishable material in the years 1870-71; and in some cases required entire reconstruction, in others extensive repairs. This work has been performed by the superintendent in charge, and added largely to his expenditures. The banks, also, especially through the Montezuma marshes, had settled considerably, and it became necessary to raise and strengthen them, to avoid danger of breaches. For this latter work nearly \$13,000 was expended. It is believed no further or considerable outlay will be required the ensuing season for repairs of this nature.

The work of removing wall benches on the Jordan level, under specific appropriation, has progressed energetically, involving a cost of \$31,500.

### OSWEGO CANAL.

This canal extends from Syracuse to Oswego, thirty-eight miles; and includes the Seneca river towing-path and Baldwinsville canal and the Oneida River improvement. It is divided into two repair sections, as follows:

#### REPAIR SECTION No. 1.

IRA BETTS, *Superintendent*. MEAD BELDEN, *Repair Contractor*. Contract expires January 1, 1872.

This section extends from Syracuse to Three River Point, and includes the Seneca River towing-path and Baldwinsville canal; total, twenty-one and a half miles.

The structures are: Four lift stone locks; one composite lift lock; one wooden lift lock; one wooden guard lock; four composite culverts; five iron road bridges; one iron change bridge; eleven wooden road bridges; four wooden change bridges; two floating tow-path bridges; one wooden river dam; three waste-weirs; four lock-houses; one State shop.

The expenditures upon this section during the fiscal year were as follows:

## ORDINARY REPAIRS.

Compensation of repair contractor.....	\$18,499. 92	
By superintendent, chiefly on Baldwinsville canal and Seneca river towing-path,	5,085 64	
By Canal Commissioner, damages for removing warehouse at Baldwinsville,	350 00	
		<u>\$23,935 56</u>

*Work authorized by Legislature and Canal Board :*

Enlarging culvert at Salina.....	\$13,005 00	
Raising and protecting the banks.....	12,954 00	
Vertical wall on enlargement, section No. 4.....	561 00	
Rebuilding docks on side-cuts at Salina..	6,664 00	
Rebuilding iron bridge at Cold Spring..	238 00	
Rebuilding bridge at Durston's dry dock,	525 90	
State ditch between Mud lock and Liverpool.....	3,750 00	
Vertical wall near Bradley's brook.....	3,188 00	
Iron bridge at Salina.....	3,536 00	
Road and change bridge near Mud lock.	1,674 25	
Vertical wall on Syracuse level.....	9,202 59	
Iron bridge at Bear street, Syracuse.....	3,056 28	
		<u>58,355 02</u>
Total on section.....		<u><u>\$82,290 58</u></u>

## REPAIR SECTION NO. 2.

IRA BETTS, *Superintendent*. A. C. BELDEN, *Repair Contractor*. Contract expires January 1, 1874.

This section extends from Three River Point to Oswego, including the Oneida River improvement, forty-three miles. The structures are: Thirteen stone lift locks; five stone guard locks; two steam-boat lift stone locks (120 x 30); five wooden waste-weirs; seven wooden road bridges; two wooden road and change bridges; six wooden change bridges; one wooden river tow-path and change bridge; two iron road bridges; three stone river dams; six wooden river dams; one aqueduct; one bulk-head; one draw-bridge; four composite culverts; twenty lock-houses; one State shop.

The expenditures upon this section during the fiscal year were as follows:

## ORDINARY REPAIRS.

Compensation to repair contractor.....	\$28,400 00	
By Commissioner, land damages, temporary occupation.....	175 00	
		<u>\$28,575 00</u>

*Work authorized by Legislature or Canal Board:*

Bulk-head at Farwell's mill.....	\$1,750 35	
Constructing high dam.....	39,950 00	
Constructing Minetto dam.....	16,354 00	
Raising the banks.....	6,341 00	
Restoring the breaches between Hin- mansville and Horse-shoe dam.....	11,451 00	
		<hr/> 75,846 35
Total on section.....	\$104,421 35	<hr/> <hr/>

*Charged to general management of Oswego canal:*

Salaries of assistant engineers and inspectors.....	\$3,811 00
Labor, etc., State dredge.....	177 50
Postage, stationery and miscellaneous.....	217 53
	<hr/> \$4,205 03 <hr/> <hr/>

Under the head of "ordinary repairs" on the Oswego canal, but little expense has been incurred in addition to the compensation of repair contractor. Certain necessary work on the Seneca river tow-ing-path and Baldwinsville canal, which did not come within the repair contract, was performed by the superintendent in charge. His total expenditures for this purpose, and salary and incidental expenses, amount to \$5,085.64.

Under the other heading, a large amount of work, as required by law, has been performed by contract, at prices advantageous to the State. The most extensive and *expensive* of such improvements are the building of two dams on the Oswego river, enlarging the culvert at Salina, constructing vertical wall on the Syracuse level, and raising and strengthening the banks. A new tow-path has been constructed on the west bank of the Seneca river, at its confluence with the out-let of Onondaga lake, about half a mile in length, thus dispensing with a precarious floating bridge, hitherto maintained at large expense to the State. These several improvements will greatly and permanently improve navigation, and should lessen future cost of management of this canal.

## CHENANGO CANAL.

This canal extends from the Erie canal at Utica to the Susquehanna river at Binghamton, ninety-seven miles. It comprises three repair sections, as follows:

## REPAIR SECTION No. 1.

J. W. FORWARD, *Repair Contractor.*

This section extends from the junction of the Chenango and Erie canals, in the city of Utica, to the foot of lock 81, one mile south of the village of Hamilton, thirty-one miles. The following reservoirs are located upon it: Madison brook, Woodman's pond, Leland's pond, Bradley's brook, Hatch's lake, Kingsley's brook and Eaton's brook, all of which are in the southern part of Madison county. Connected with the section are  $13\frac{1}{2}$  miles of feeder. Total canal and feeders,  $44\frac{1}{2}$  miles. The structures are: Seventy-seven composite lift locks; four stone lift locks; four wooden trunk aqueducts; one stone arch culvert; one guard lock; twelve arch culverts; seven box culverts; nine waste-weirs; three iron bridges; forty-four wooden bridges; thirty bridges on feeders.

The expenditures on this section during the last fiscal year were as follows:

## ORDINARY REPAIRS.

*By superintendent:*

Repairs of locks .....	\$8,004 66	
Lock-tending .....	5,156 26	
Repairs waste-weirs, culverts and aqueducts, .....	1,889 63	
Construction and repairs of bridges.....	2,766 20	
Cleaning and bottoming down .....	2,905 24	
Work on feeders and reservoirs .....	1,592 82	
Reconstruction of four locks.....	42,190 53	
Salaries and miscellaneous.....	3,986 06	
		<hr/>
		\$68,491 40

*Work authorized by Legislature or Canal Board:*

Rebuilding lock No. 18 .....	\$1,208 07	
Rebuilding lock No. 19 .....	1,259 99	
Rebuilding lock No. 22.....	2,710 72	
Repairs Kingsley Brook feeder.....	11,226 45	
		<hr/>
		16,405 23

Total on section .....	<hr/>	\$84,896 63
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The cost of repairs on this section may seem inordinately heavy, but was unavoidable in keeping it even in fair navigable condition. Most of the seventy-seven composite locks required more or less repair. In the case of four, partial reconstruction was found absolutely indispensable. The work was done under superintendent's contracts, at itemized prices approved by the Canal Commissioner and division engineer in charge. The rates were equally as low and

favorable for the State as those secured after advertising and public lettings for similar work on the same canal.

By repairs of the Kingsley Brook feeder, that structure has been made available and extremely useful in supplying the northern portion of this canal during the dry season, as also the eastern portion of the long level of the Erie canal.

#### REPAIR SECTION No. 2.

C. W. OLENDORF, *Superintendent*. JOHN HULL, *Repair Contractor*. Contract expires January 1, 1878.

This section extends from the foot of lock 81 to and including the first farm bridge above lock 100; distance thirty-four miles. The structures are: Eighteen composite lift locks; eighteen wooden trunk aqueducts; six waste-weirs; nine bridges on feeders; three iron bridges; sixty wooden bridges; thirteen arch culverts.

There are six feeders with an aggregate length of four miles, with dams to the length of 1,000 feet.

The expenditures upon this section during the fiscal year, were as follows:

#### ORDINARY REPAIRS.

Compensation of repair contractor.....	\$9,970 00	
Salary of superintendent, and miscellaneous,	1,013 32	
Land damages, temporary occupation.....	50 00	
		<hr/>
		\$11,033 32

#### *Work Authorized by Legislature or Canal Board:*

Mitchell street bridge, at Norwich.....	\$2,057 00.	
To W. H. Baker, under chap. 462, Laws of '71,	404 27	
		<hr/>
		2,461 27

Total on section.....	<hr/>	\$13,494 59
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This section is one of the six in which the Canal Commissioner deemed it expedient with a view to wise economy, to continue under the existing repair contract, and wherein the contractor manifested a willingness to retain and fulfill such contract. For the attention necessarily given and outlay incurred, his compensation is exceedingly moderate. The wisdom of not annulling such contract is made clearly apparent by the comparatively light expense borne by the State on account of this section.

In view of its extent and the number of wooden structures, locks, aqueducts, bridges, etc., this section has been most economically and

exceptionally well managed by the repair superintendent. This, however, may be partly owing to the fact it was left in better condition, when surrendered by the late repair contractor, than any other section on this division.

The specially authorized work embraced the reconstruction of four locks, which had so utterly decayed and failed as to disable them from passing boats and render their reconstruction imperative. The total cost is not given in the foregoing table, as final accounts had not been rendered at the close of the fiscal year.

An iron bridge at Court street, Binghamton, with double roadway, and two swing-bridges, of the "Winkler" patent, one at Henry street, Binghamton, and one at Greene, have been constructed, the total cost of which is above reported.

#### REPAIR SECTION No. 3.

J. B. WILLMOTT, *Superintendent*. Contract surrendered April 15, 1870, under act chap. 55, Laws of 1870.

This section extends from the first bridge north of lock 100 to the junction of the canal with the Chenango and Susquehanna rivers, in the village of Binghamton; distance thirty-two miles. The Stratton and Chenango Forks feeders are located on this section, the Stratton being about fifty rods in length, with a dam 350 feet in length, and having two bridges, one farm, the other towing-path. The Chenango Forks feeder consists of a dam 350 feet in length, with a guard lock, having a towing-path bridge across it. The structures are: One stone lift lock; fourteen composite lift locks; one guard lock; two dams; seven waste-weirs; five wooden trunk aqueducts; three iron bridges; fifty-five wooden bridges; ten arch culverts; one bridge on feeder.

The expenditures on account of this section during the fiscal year were as follows:

#### ORDINARY REPAIRS.

##### *By superintendent:*

Repairs of locks and lock-gates.....	\$5,135 19	
Repairs of culverts, aqueducts, and waste-weirs.....	2,042 85	
Repairs of road, farm and tow-path bridges.....	3,103 67	
Bottoming down and cleaning canal.....	. 793 00	
Raising and repairing tow-path, slope wall, etc.....	2,122 70	
Salaries, lock-tending and miscellaneous..	2,697 73	
	<hr/>	\$15,895 14



By Commissioner on bridge approaches at Binghamton, \$50 00

*Work authorized by Legislature or Canal Board.*

Swing-bridge at Binghamton .....	\$ 1,998 25	.....
Court St. Bridge at Binghamton .....	6,375 00	.....
Swing-bridge at Greene .....	2,811 55	.....
Reconstructing lock No. 101 .....	12,002 00	.....
Reconstructing lock No. 107 .....	12,842 00	.....
Reconstructing lock No. 108 .....	9,146 00	.....
Reconstructing lock No. 110 .....	1,471 75	.....
	<hr/>	46,646 55

Total on section ..... \$62,591 69

GENERAL EXPENDITURES.

Salaries assistant engineers and inspectors..	\$3,945 00	
Printing and advertising .....	51 00	
	<hr/>	\$3,996 00

CHEMUNG CANAL.

SILAS HAIGHT, *Superintendent.* JARVIS LORD, (*Assignee*) *Repair Contractor.*  
Contract expires January 1, 1872.

This canal extends from the head of Seneca lake, at Watkins, to Elmira, including the feeder from Horseheads to Knoxville, making a total distance of thirty-nine miles of navigable canal.

The structures are: Two composite locks; thirteen timber locks; one timber guard lock; thirty-eight old timber locks; four aqueducts; thirteen waste-weirs; two culverts; one dam and bulk-head; three road bridges (iron); thirty-five road bridges (wood); fourteen farm bridges; one towing-path bridge (wood); one towing-path bridge across Chemung river.

The expenditures upon this canal during the fiscal year were as follows:

ORDINARY REPAIRS.

Compensation of repair contractor .....	\$36,000 00	
Repairs of breaks at Corning in 1870...	64,264 26	
By superintendent, including salary .....	3,513 61	
Employes and repairs of State tug .....	2,587 77	
Damages, temporary occupation .....	300 00	
Salaries assistant engineer, inspectors, etc.,	6,159 00	
Miscellaneous .....	333 71	
	<hr/>	\$113,158 35

*Work authorized by Legislature or Canal Board :*

Raising and extending break-water at Watkins.....	\$14,324 16	
Dredging from lock No. 1 to Seneca lake,	5,865 00	
Cleaning and deepening ditch at Horseheads.....	1,375 90	
Rebuilding bridges at Horseheads.....	5,769 00	
Culvert and waste-weir at Elmira.....	2,766 10	
Rebuilding bridge at Watkins.....	1,921 00	
Protecting banks of Mill creek .....	2,090 00	
Claim of S. T. Arnot.....	244 15	
		<hr/>
		\$34,355 31
Total.....		<hr/>
		\$147,513 66

Included in the above reported expenses for ordinary repairs, because settled and paid within the fiscal year, is the heavy sum of \$64,264.26, on account of repairing the most extensive and disastrous break at Corning, and destruction of the dam at Gibson, occasioned by the sudden and unusual floods in the spring of 1870. Details showing the great magnitude of such damages and the amount of labor and material necessary for and time consumed in repairs, were given by the undersigned in his last annual report, and need not now be repeated.

A tug, purchased by the undersigned for the State for such purpose, is still kept plying between Corning and Gibson, during the season of navigation, to assist boats passing to and from such points. This provision has been made in lieu of reconstructing the former towing-path, dyke, and bridge, which were swept away by the great flood alluded to. The expense incident to this service is quite insignificant, and such arrangement fully meets the wants of boatmen and forwarders.

Upward of \$2,000 has been expended by the superintendent on work approved by the Commissioner, and which could not justly be exacted of the repair contractor under the terms of his contract.

For the necessary protection of large fleets of boats which load at the head of Seneca lake, the work of raising and extending the break-water has been provided for and is progressing. Also, pursuant to law, the level between lock No. 1 and Seneca lake is to be maintained of equal capacity with the enlarged canals. In consequence, partly of filling in with bars, and partly from the low stage of water in the Seneca lake, it becomes necessary to dredge out this level quite extensively. The Legislature having provided the means, a contract was entered into and is being fulfilled of doing this work ; a portion

of such expense being above reported. Rebuilding three bridges, the construction of a culvert and waste-weir at Elmira, cleaning and deepening State ditch at Horseheads, and protecting banks of Mill creek, comprise other work which public exigency, in the opinion of the Legislature, seemed to require.

The harbor at Watkins, although nominally connected with and treated as part of the Chemung canal, and improvements in and about which are made chargeable to account of said canal has, in reality, far greater importance in its relation to the commerce and navigation of the whole State. At this point are made extensive transshipments from cars to canal boats of the products of the Pennsylvania coal mines. Boats loading at Watkins and coal points are towed through Seneca lake, thence navigate the Cayuga and Seneca canal, and locking into the *Erie* at Montezuma, convey their freight to every port on this great artery; and much of their freight seeks a market in Canada and the west via the Oswego canal, thus contributing materially to the tonnage of the enlarged canals, and increasing their revenues. Hence, the undersigned has regarded with favor and recommended adequate appropriations by the State to provide for the important commerce of Watkins harbor. The rapidly increasing growth of this coal traffic and transportation, renders further work of the nature of that in progress, and for which existing appropriations are nearly exhausted, indispensable, and further provision therefor is earnestly recommended.

### CAYUGA AND SENECA CANAL.

JOHN HAGGERTY, *Superintendent*. Contract surrendered April 15, 1870, under act chapter 55, Laws of 1870.

This canal extends from Erie, at Montezuma, to Seneca lake, at Geneva, with a branch from lock 9 to East Cayuga, at the foot of Cayuga lake. Total miles in length, twenty-three.

The structures are: Eleven composite lift-locks; one side-lock at Seneca Falls; nine culverts; one pier at foot of Cayuga lake; one pier at foot of Seneca lake; seven iron bridges; fifteen wood bridges; five dams.

This canal was under contract for annual repairs with Geo. M. Case, as assignee of Geo. Collins, until April 15, 1870, when said contract was abrogated by the Canal Board, upon petition to that effect by the contractor. Since the date above given the repairs and immediate supervision of the canal have been confined to the superintendent in charge.

The expenditures and payments for all purposes, for the past fiscal year, have been as follows:

## ORDINARY REPAIRS.

*By Commissioner :*

Salaries assistant engineer and inspectors..	\$1,236 00	
Maintaining revolving beacon at Geneva...	553 70	
Patrolmen .....	200 00	
Damages, temporary occupation.....	100 00	
Miscellaneous.....	221 56	
		<hr/> \$2,311 26

*By superintendent :*

Repairs of locks, lock-gates and lock-tending,	\$10,271 05	
“ waste-weirs and culverts.....	231 18	
“ bridges .....	4,617 76	
“ State scow, workshop, lock-houses, etc.....	1,002 42	
Repairing tow-path, cleaning out bottom, etc.	3,605 05	
“ docking, slope wall, etc.....	4,189 96	
Tools, etc., snubbing posts, etc.....	694 40	
Dredging, assisting boats, etc.....	2,904 41	
Salaries, and miscellaneous.....	2,406 95	
		<hr/> 29,923 18

*Work authorized by Legislature or Canal Board :*

Berne protection along Seneca lake.....	\$11,168 35	
Iron bridge at Ovid street, Seneca Falls...	4,998 51	
Swing-bridge, lock No. 11. ....	771 17	
Vertical wall between locks 4 and 5.....	5,586 45	
Extra work, repairs bridges.....	518 48	
Award by Canal Board to John Fitzpatrick, for work on enlargement, section No. 13.	4,672 00	
Work on berme bank at Geneva in 1863..	1,210 18	
		<hr/> 28,920 14
Total .....	\$61,154 58	<hr/>

*Ithaca Inlet—From General Fund.*

Dredging and work on breakwater .....	\$11,332 84	<hr/>
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But little work, under the head of “ordinary repairs,” had been done on the mechanical structures or banks of this canal during the ten years preceding 1870. The repair contract was surrendered in the spring of that year, when the superintendent commenced and prosecuted vigorously the long-neglected and necessary labor. While much was accomplished the first year under the superintendent's charge, in repairing locks, lock-gates, bridges, docking and slope wall,

as well as in raising the banks where settled, much remained to be done during the succeeding year of the same nature, involving quite heavy expenditures. Being more immediately under the eye of the Commissioner in charge than other portions of his division, his residence being at one of its termini, he has had unusual opportunity for scrutinizing the work and expenditures on the Cayuga and Seneca, and bears cheerful testimony to the vigilance and economical management of the superintendent.

As provided for in the Laws of 1870 and '71, the work of protecting the berme bank along the north shore of Seneca lake has been prosecuted. During the floods, early in the season of 1870, the lake overflowed the narrow bank separating it from the canal, and a considerable quantity of earth and gravel was washed into the latter. The berme has been raised about three feet, and protected on its lake side by a substantial wall of loose stone. The appropriation was exhausted before fully completing this work, and a further sum of \$2,000 is necessary and recommended for such object.

Other work as directed by law has been performed in constructing vertical wall between locks 4 and 5, and in rebuilding of iron the bridge at Ovid street, Seneca Falls; while that of constructing a culvert or sewer at Waterloo, and a stone pier or breakwater in the river at Seneca river, is progressing under favorable circumstances.

A clause in chapter 715, Laws of 1871, makes provision for finishing the work and improvements at the head of Cayuga lake. Of the appropriation \$11,332.84 has been expended.

The season of 1871 and thus far in the present year, has been marked as a period of unparalleled drouth, seriously affecting navigation of the lake levels between Geneva and Waterloo and at Cayuga. The water became so low that in October it was found necessary to reduce the draft of boats to five feet nine inches, and still later to five feet six inches. From the close of navigation to this date, (March 1st), the supply from the water-shed has been far less than the drainage through the outlet, causing grave apprehension of a large deficiency for the needs of navigation the coming season. A *dernier resort* is to stop further drainage and store future supplies from rain-falls and melted snow, by temporarily damming both the outlet and the canal near its mouth.

The superintendent reports to the Commissioner certain necessary spring repairs; dredging out lake level, taking out rock to canal bottom from head of island to first lock, cleaning out bars, raising the banks on some of the levels, reconstructing two or three bridges, and

renewing some of the lock-gates; but the undersigned is of opinion that everything properly coming under the head of "ordinary repairs," may be accomplished at a great reduction in the aggregate expense of the last fiscal year.

## CROOKED LAKE CANAL.

O. G. SHEARMAN, *Superintendent*. O. C. KNAPP, *Repair Contractor*. Contract expires January 4th, 1874.

This canal extends from Crooked lake, near Penn Yan, to Seneca lake, at Dresden; distance eight miles. The structures are: Twenty-seven lift locks; one guard lock; six waste-weirs; two culverts; fourteen bridges; four dams.

The expenditures upon this canal, during the fiscal year, were as follows:

## ORDINARY REPAIRS.

Compensation of repair contractor .....	\$7,750 00	
Brush for protecting banks.....	50 00	
Salaries of assistant engineer and inspectors .....	1,006 00	
Miscellaneous .....	60 04	
		<hr/>
		\$8,866 04

*By Superintendent:*

Reconstruction of six locks.....	\$60,651 44	
Lengthening lock No. 1.....	2,678 91	
Salaries and miscellaneous.....	2,829 31	
		<hr/>
		66,159 66

*Work authorized by Legislature or Canal Board:*

Protecting the banks.....	\$2,800 00	
Bottoming down lake level.....	1,813 28	
		<hr/>
		4,613 28

Total .....		<hr/> <hr/>	\$79,638 98
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It will be observed that a heavy expenditure has been incurred on this canal in reconstructing six of the locks. The old ones had so utterly decayed in every part that there was but the alternative of rebuilding them, or of permitting navigation to be absolutely suspended. The work was done during the winter months under the superintendent's auspices, at a cost slightly exceeding \$10,000 per lock; and included in the aggregate expense is a surplus of material left on hand valued at between \$1,000 and \$2,000. The new locks were ready and brought into use within a few days after the opening

of navigation. They were built on the new plan of rubble masonry with oak fenders and pine hollow quoins, and have proved most substantial in material and workmanship, while costing less than most of such structures in cases where they have been advertised and let to the lowest bidder. In this instance, at least, it cannot be charged that either waste, extravagance, neglect or carelessness has attended the superintendent's system of conducting public work.

### ONEIDA LAKE CANAL.

This canal, when completed, will connect the Erie canal with the waters of the Oneida lake, furnishing thirty miles of lake navigation, intersecting the Oneida river improvement, which forms a junction with the Oswego canal at Three River Point.

The expenditures for construction during the fiscal year were as follows:

Constructing section No. 2.....	\$8,029 20
Constructing section No. 3.....	1,054 00
Constructing section No. 4.....	12,110 00
Constructing section No. 5.....	26,785 00
Engineering expenses.....	3,600 00
Miscellaneous.....	36 25
	<hr/>
	\$51,614 45

### CHENANGO CANAL EXTENSION.

The expenditures upon this work during the fiscal year were as follows:

By draft on Auditor and certificates of indebtedness issued,	\$132,191 12
Miscellaneous.....	2,463 10
	<hr/>
	\$134,654 22

### LAND DAMAGES.

*Statement showing the aggregate of payments by draft and certificate on account of awards made by the Canal Appraisers for land damages, for the fiscal year ending September 30, 1871.*

Erie canal .....	\$16,053 35
Oswego canal.....	5,582 40
Chemung canal and feeder.....	37,001 04
Oneida river improvement.....	9,172 11
Extension of the Chenango.....	13,091 55
	<hr/>
	\$80,900 45

STATEMENT showing names of repair contractors, annual compensation, etc.

CANALS.	No. of section.	Names of contractors.	Annual compensation.	Date of contract.	Expiration of contract.
Erie .....	8...	Aaron G. Fish .....	\$18,000	Mar. 1, 1869	Dec. 31, 1873
Chemung .....	All..	Jarvis Lord, assignee .....	36,000	Jan. 1, 1867	Dec. 31, 1871
Chenango .....	2...	John Hull .....	9,970	Dec. 1, 1868	Dec. 31, 1872
Oswego .....	1...	Mead Belden, assignee .....	18,500	Jan. 1, 1867	Dec. 31, 1871
Oswego .....	2...	A. Cadwell Belden .....	28,400	Mar. 1, 1869	Dec. 31, 1873
Crooked Lake .....	All..	Oliver C. Knapp .....	7,750	Mar. 1, 1869	Dec. 31, 1873



CONDITION AND WANTS OF THAT PORTION OF THE MIDDLE DIVISION EMBRACING THE ERIE CANAL FROM THE WAYNE COUNTY LINE TO HIGGINSVILLE, THE OSWEGO AND THE CAYUGA AND SENECA CANALS.

The unfortunate setting in of winter in the last days of November was quite unexpected (with but a single precedent, it is believed, in the history of our canals), and proved very disastrous to the boating and shipping interest.

The meager supply of water, which caused much embarrassment in the season of 1870, continued throughout the past year, and reservoirs which hitherto had never been entirely exhausted were emptied to their last foot. Except for the copious supply taken from the new and valuable Oriskany feeder, the Rome level would have been incapable of floating boats drawing the regulation depth, weeks before the close of navigation.

The experience of the past season abundantly confirms the position taken by the undersigned, in his last annual report, viz., that additional reservoirs should be provided, at the earliest practicable date, on the western portion of this level. And this necessity becomes the more apparent from the fact that, on the first of March, there is a much smaller body of snow on the water-shed of our lakes and other reservoirs than has been known for many years.

It is believed, if prompt action can be had in making certain funds now in the treasury available for this purpose, a dam can be erected on Butternut creek, near Jamesville, in time to store a considerable quantity of water for use in the coming season. This supply, even if it be but small, will prove exceedingly useful; for, being but four miles from the canal, it can be readily resorted to whenever boats get aground in the neighborhood of Manlius, as they so often have for the last two years. This improvement is most earnestly urged upon the attention of the Legislature, as a work which will not only give immediate relief to boatmen, but prove an economical, convenient and efficient feeder, being near the point where past experience proves it is most needed, and, as a permanent work, make a valuable addition to our system of reservoirs and feeders.

Within the last two years the Oswego canal has been materially improved. The last of the new dams on the river, where stone is substituted for the old wooden structures, is in a condition which warrants the expectation that it will be completed during the coming season, if adequate appropriations are made. The low banks have been raised, and other improvements have been completed, and this canal, with such further, and by no means expensive, improvements

as are suggested by the late division engineer, is doubtless capable of accommodating the large tonnage which it is confidently hoped may be attracted to it.

The Cayuga and Seneca canal, the extensive and rapidly growing coal trade of which has given it great importance of late, is threatened with a serious interruption of its business by the extraordinary low water of Seneca lake. Such a disaster should be arrested, if possible, by any means within the control of the Commissioners. There seems to be no alternative but to stop the flow of the outlet for some weeks, and doubtless this measure will be strenuously resisted by some of those who enjoy the surplus waters of this stream; but this does not justify any hesitation about this remedy. When the enlargement of the canal was authorized and about to be commenced, the Canal Commissioners made such further appropriations of the waters of the outlet of Seneca lake as was necessary for such enlarged canal, embracing the *first use and control of all of said waters*. The works necessary to enable the State to control this stream, through her canal officials, were completed at Seneca Falls, and the consequence is there is no interference with or dispute about the rights of the State. At Waterloo, the erection of works designed to accomplish the same object, was postponed through the importunities of parties interested in the hydraulic powers, *though the appropriation remains intact*, and this unfortunate concession has resulted as might have been expected, as the mill owners now claim the control and first right, and constantly deny power in the State officials to do those acts essential to the maintenance of navigation.

There should be a fund placed at the disposal of the Canal Board, of not less than \$25,000 for this division, for the following objects:

1st. For rendering more secure, the banks of the enlarged canals or their mechanical structures, where indications of weakness are observed. While it is clear that an actual breach or the imminent danger of any disaster can be provided for as an ordinary repair, possible failures or improvements in the banks and structures of the canals, can scarcely be chargeable upon a fund sacredly devoted to "ordinary repairs and maintenance." For instance, if it had been suggested that stone and brush might strengthen the banks in the neighborhood of "Pool's brook," in the absence of any immediate apparent danger, the legality of such an expenditure would be rightfully questioned, if not denied by the Auditor.

2d. There are many points where leaks from the canals inundate lands *outside* of the "blue line," and ditches to avoid injustice

to our citizens and the multiplication of claims, should be constructed by the State, but there are no funds applicable to such purposes. There are many other like cases which cannot well be enumerated here, but which should be promptly settled if due regard is had to economy.

#### CHENANGO EXTENSION.

Under chapter 930, Laws of 1871, \$175,000 were appropriated to be applied to this work between Binghamton and Owego. On ascertaining that this sum would be insufficient to accomplish the object, the money has been carefully applied to the completion of such portions thereof as might be injured or destroyed by further neglect, to the preservation and protection of destructible materials delivered, and likewise to the completion of such works as, if longer deferred, might give rise to further claims against the State.

The project of constructing an expensive stone dam across the Susquehanna river, and making a towing-path up to the new terminus of the old Chenango canal, has been abandoned, and the old dam is being raised, strengthened and thoroughly repaired, and connected with the southern shore by a bulk-head and guard-lock. This work will absorb something more than the appropriation on hand, but it cannot be abandoned or postponed without a certainty that the ice and spring floods will destroy more or less of the old dam and improvements, and subject the State to heavy claims from the owners of mill power on the north or Binghamton side of the river.

For the expense of completing this canal to Owego, including the new connection with the old Chenango canal, reference is respectfully made to the subjoined report of the division engineer.

Whatever may be the commercial value of this work when finished, the State cannot regard that consideration alone; but the claims of citizens whose lands have been appropriated for a canal, whereon only an unsightly nuisance has been created, must be also considered.

The new terminus of the original canal is entirely within the city limits of Binghamton. It is about half constructed, and should be completed, as a portion of the old terminus has already been abandoned, thus leaving an insufficient outlet for the water. To prevent further expense in maintaining the channel, bridges and other structures thereon, it is earnestly recommended that it be ceded to the city of Binghamton.

## THE LATERAL CANALS ON THE MIDDLE DIVISION.

Of the lateral canals on this division, but two, viz., the Oswego and the Cayuga and Seneca, have been enlarged to correspond with the Erie, and these have a large and growing commerce. The new Oneida Lake canal is likewise on the enlarged plan ; but considerable expenditures are yet to be made before it is completed. The Oneida river improvement, which has little commerce, may be fairly classed with the non-productive canals on this division.

The others, viz., the Chenango, the Chemung canal and feeder, and the Crooked Lake, were constructed nearly forty years ago, and, while they were never profitable as an investment, they did serve, up to the time when they were paralleled by railroads, to accommodate and develop valuable districts of the State, abounding in agricultural and mineral wealth, and they likewise opened new markets for the once important products of the forest in those regions. But the construction and organization of a complete system of railroads throughout the valleys occupied by these canals, in some instances located upon their very banks, has wrought a complete change in their practical value, and created a competition for their only remaining business, viz., *the coal trade*, which, it is already demonstrated beyond reasonable doubt, must render their maintenance for navigation in the future, as it has been in the recent past, almost useless. The locks and other mechanical structures, being originally constructed mostly or wholly of wood, are generally badly decayed, having nearly or quite outlived their allotted time. Navigation can scarcely be maintained for another season without replacing them at a heavy expense. It has been suggested that these canals might still serve a useful purpose in keeping the tariff of railroads within reasonable limits ; but it is found that the owners and managers of the railroads practically control the coal mines and their products, and seldom permit the lateral canals to share their business.

Thus the question, whether our forty foot canals could compete with the railroads under any circumstances, has no practical importance. Still they are as much the property of the people as our larger and profitable canals, and the Constitution provides that they shall "never be leased, sold, or otherwise disposed of," but they must "remain the property of the State and under its management forever." Hitherto the undersigned has regarded it a duty to maintain the navigation of these canals, whatever might be the expense ; and hence, in the two years which have elapsed of his present term of office, he has expended nearly \$150,000 for reconstruction or partial

reconstruction of locks on the Chenango and Crooked lake canals, over and above the amount expended for ordinary repairs and maintenance, while the receipts for tolls have dwindled to less than three per cent of his expenditures for all purposes, chargeable to these canals. He now finds himself in this dilemma. If he should expend *all* the fund intrusted to him for keeping his division in proper navigable order, such sum would be insufficient to restore these canals to a good condition, and he would not be certain of maintaining a perfect navigation thereon. Wherefore, he most respectfully asks the Legislature to direct how far these repair moneys shall, in the future, be expended on such objects.

The following is a summary of expenditures for all purposes on these canals, for the fiscal years 1870 and 1871, including the Chenango extension and Oneida lake :

For ordinary repairs and maintenance, including breaks and the reconstruction of locks, from canal revenues . . . . .	\$554,958 95
For extraordinary repairs, new work, land and other damages, all being in pursuance of special laws of the Legislature and paid by direct taxation . . . . .	1,038,228 25
	<hr/>
	<u>\$1,593,187 20</u>

Of the expenditures directed by the Legislature, only a small portion was recommended by the Commissioner, the balance being a concession to the demands of interested localities.

It thus appears that within the past two years, more than \$1,000,000, drawn in the shape of taxes directly from the pockets of our citizens, and over \$550,000 of revenues of our productive canals have been expended upon these water ways, which have returned in the gross amount of tolls collected, but \$43,832.03, with no prospect of the slightest increase of such tolls in consequence of these expenditures, nor indeed from any other cause which can now be anticipated. Formerly, it was claimed that the lateral canals did not get full credit for their contributions to the business and revenues of the Erie canal. Prior to the change in the tonnage of boats wrought by the enlargement, this may have been measurably true, but now it is seldom that cargoes of seventy-five to ninety tons, traversing the lateral canals, are destined to any distant point beyond their confluence with the Erie, and hence they add only a trifling amount to the tonnage or revenues of our enlarged canals.

If, for any cause, commerce has deserted these once useful water-

ways, with no rational hope of its return, the question is now forced upon us and must be met, whether the heavy and increasing cost of keeping them in navigable condition, causing thereby a heavy drain upon our revenues for that purpose alone, or whether such expenditures shall be wholly or partially suspended until a new policy can be inaugurated, better adapted to the present condition of affairs?

For additional details relating to work done and expenditures incurred, and the present condition and contingent wants of the canals, of the Middle Division, I respectfully refer to the appended report of M. S. Kimball, Esq., late division engineer, and to the accompanying statistical tables.

All of which is respectfully submitted,

WM. W. WRIGHT,  
*Canal Commissioner.*

## APPENDIX.

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DIVISION ENGINEER'S OFFICE, }  
SYRACUSE, September 30th, 1871. }

Hon. W. W. WRIGHT, *Canal Commissioner* :

DEAR SIR.—I herewith present you with a report accompanied by tables showing the work done under the supervision of the engineer department, aside from the engineering for the ordinary repairs for the past fiscal year :

### ERIE CANAL.

#### REPAIR SECTION No. 7.

This section extends from Higginsville to the Limestone creek feeder at Fayetteville, twenty-seven miles, embracing the Oneida, Cowasselon, and Chittenango creek feeders, and the Erieville and Cazenovia lake reservoirs. The work done on this section for the fiscal year ending September 30th, 1871, as extraordinary repairs under contract, amounts to \$1,078.53, which is settled, and the amount done as miscellaneous repairs not under contract, \$18,513.81, the details of which will be found in tables 2 and 3 of this report.

The waterway under the aqueduct at Cowasselon has become filled up with a material resembling gravel, though it is not properly gravel ; it is a lighter substance, composed of marl, easily moved by the current and brought down the creek in large quantities at every freshet. When a head of water is applied at the openings of the aqueduct, it is forced out and deposited along down the channel below. This goes on until the channel is full and then clogs up, or is liable to clog up at the aqueduct to such an extent as to endanger the banks of the canal. The aqueduct and channel are both now much filled with it, and it should be removed. Iron needle beams have been put into the iron bridges at Chittenango, Canastota, and Durhamville on change of plan, and an iron bridge built at Oneida under act chapter 67, Laws of 1870. Brush and stone have now been put on to the rear slopes of the banks at all of those places con-

templated upon the examination after the breach at Pool's brook. The banks, however, are yielding by slow degrees at some other places, and will eventually require similar protection. The waste-weir at Durhamville was taken up and rebuilt last spring by the superintendent, and is now safe and permanent. But little bottoming was done, and nothing toward reducing the high bottom east of Chittenango, described in last years report. The ditch below the diving culvert at Potter's is so much filled up that sudden rains no longer clear the culvert before doing damage above, this should be opened. The superintendent opened a similar one last summer at Case's, and it now works well. Navigation has been uninterrupted, except what grew out of the want of water for the long level generally.

#### REPAIR SECTION No. 8

Extends from the Limestone creek feeder at Fayetteville, west, embracing the remainder of the long level, six miles, the Syracuse level, five miles, and to a point 100 feet west of the outlet of the Nine Mile creek or Camillus feeder, on the Jordan level, three miles, total fourteen miles; also, including the Limestone and Butternut creek feeders, the Camillus feeder, and De Ruyter reservoir. The work done for the fiscal year as extraordinary repairs under contract and settled is \$276,926; unsettled, \$37,720, with \$71,752 to complete. The amount done as miscellaneous repairs not under contract is \$9,310.14. The bottoming down on the long level was not progressed last winter for the want of appropriations sufficient to complete it. But for what had been done previous, great detentions would have occurred last summer from the want of water to supply this portion of the canal. The Erieville reservoir was entirely empty on the first of October, the De Ruyter on the 10th of November, and Cazenovia lake practically empty on the 21st of November, there being nothing but the natural flow of the stream left. The Cowasselon and Oneida creeks, farther east, were not sufficient, and but for the turning in of the Oriskany the canal would not have been relieved. As it was, the level at lock 47, the western terminus of the long level, was pretty uniformly drawn down from four to twelve inches after the first of October. Sufficient appropriation should be made and the bottoming done, and I would also recommend that it be extended east to the Manlius bridge, the water being extra deep beyond for a long distance. A new reservoir should then be constructed on the Butternut creek, a half a mile above Jamesville, furnishing 1,989 cubic feet per minute for sixty days, over and



above the natural flow of the stream. This, however, is on the plan of calculating for but one reservoir full for a season, while it may, perhaps, be filled twice or more. It is situate four miles from the canal, six miles from Syracuse, and enters the canal six miles east. The reservoir was first estimated to cost \$78,240, exclusive of land damages, giving 1,102 cubic feet per minute; then by raising it six feet higher, giving 1,989 cubic feet, \$85,000; and recently, upon a revision of the estimates under a resolution of the Canal Board, \$91,750 for an earth dam, or \$98,018 if built of stone. The stone one is now recommended, in the full belief that it will be the most economical for the State in the end. There is yet a little doubt about finding a good and sufficient rock foundation. I would, therefore, recommend the letting of the work on both plans, and then adopt the stone one if the foundation prove good. There was no vertical wall built on the long level last winter, and but comparatively little on the Syracuse level. What remains has the old wall benches, and are more or less a detriment to a perfectly good canal.

There has been no delay to the navigation, except what was incident to the low water on the long level.

#### REPAIR SECTION No. 9.

This section extends from a point 100 feet west of the outlet of Nine Mile creek or Camillus feeder to Jordan; also embraces the Port Byron level and the Montezuma level to the east bounds of Wayne county, thirty-one miles, including the Otisco lake reservoir, the Skaneateles reservoir and feeder, and Owasco feeder.

The work done for the fiscal year, as extraordinary repairs under contract, settled, amounts to \$4,640.71; unsettled, \$56,945, and \$6,582.50 to complete. The work done as miscellaneous repairs not under contract is \$1,622.46.

Most of this expenditure has been made for the removal of old bench walls on the Jordan level, and the substitution of slope walls in their places from canal bottom to top bank. With the finishing of every piece of new wall the facilities for good navigation is correspondingly increased. Something is to be done this winter, but a more vigorous prosecution of this change of walls would be far better for the navigation. There is no lack of reservoirs or reservoir capacity now; but the means of getting the water to the canal needs improving. The feeder dam at Jordan is fast getting out of repair, and must ere long be rebuilt. The feeder at Port Byron, although the feeder proper may be perpetuated, yet the trunk leading from it

to the canal composed of wood, a flume supported high on bents, is now so far decayed and out of order, that it is poor economy to spend any more money upon it. An iron pipe, three feet in diameter, should be put in its place and wholly buried in the earth. It will cost no more than to rebuild the trunk and keep it in repair. The trunk is thrown out of line and otherwise injured every year by the action of the frost on the foundation. The berme wall of the berme lock at Port Byron has been getting out of line for many years. It is so gradual that it is left from year to year, but it is only a question of time when it must be taken up and relaid. There was quite a large expenditure made by the superintendent last spring in repairing the aqueducts. There are five ordinary ones and one immensely large one, the Seneca river or Richmond aqueduct, over 800 feet long. The one at Jordan was pretty thoroughly overhauled last winter. The Seneca river was stripped of its planking, and many new timbers put in; but for the want of a larger quantity on hand and without time to procure them many old worthless stringers had to be left in and replanked, it would be far better economy in my judgment to at once rebuild the trunk, every part of it with new timber, than to spend so much in patching it up. The banks across the wide water east of Montezuma, and across the marshes west some two miles, although raised a foot extra height when new, are now found so low from settling in places, that the superintendents have to make a considerable expenditure in raising and walling them. At first sight this may not appear very plausible or reasonable, but when all experience shows that banks made or partly made of muck, or when their foundation, as in this case, is muck, wholly muck, and of considerable depth, and that muck forming the substructure of the banks is constantly decaying, becoming compressed and going down, then the explanation is easy. One of the greatest arguments that can be adduced as against the draining of the Cayuga marshes for the purpose of reclaiming the land, is that the soil muck will either go down with the water or follow it down sooner or later afterward. There was but comparatively little bottoming out done last season. Much must soon be done, particularly on the Montezuma level, from lock 52 west to the wide water at Montezuma, or boats will suffer for the want of it. There was a breach in the berme bank at Jordan, on the 10th of July last, suspending navigation thirty-six hours. With the exception of a sunken boat at Port Byron, causing another delay of twenty-four hours' navigation, has not been seriously hindered.

## OSWEGO CANAL.

## REPAIR SECTION, No. 1.

This section extends from Syracuse to Three River Point, fifteen miles, together with the Seneca river tow-path, six miles ; total twenty-one. The extraordinary repair work under contract and done the past fiscal year, settled, amounts to \$6,892.02 ; unsettled, \$29,530 ; and remaining to complete, \$16,139. The amount done as miscellaneous repairs, not under contract, is \$20,782.59.

More work was done last winter in repairing the docks on the side-cuts at Salina, and more is needed now ; more low tow-path near mud lock has been raised. The culvert near Haskins' salt blocks, at Salina, was taken up and enlarged, and a new outlet cut across to the lake last winter. It is thought now that with this improvement there can be no farther trouble from water backing up against the canal banks and flooding lands above for want of a sufficient outlet under. Vertical walls on the Syracuse level of this canal, and at Bradly brook on the Liverpool level, have been built as provided by the law making appropriation therefor. Iron bridges have been built at Durston's and Bear street, Syracuse ; Park street, Salina ; and at Mud lock on the Liverpool level, under the law appropriating money for changing the plan of bridges on the Middle Division. The old composite lock at Salina is to be taken down and rebuilt the coming winter. The Syracuse level of this canal, together with the short levels at Salina, were well bottomed on the tow-path sides before the opening last spring. There are large accumulations on the berme side to come out next spring. There has been no delay to navigation from any cause worthy of remark.

## REPAIR SECTION No. 2

Embraces the Oswego canal from Three River point to Oswego, twenty-three miles ; the Oneida river improvement, twenty miles ; total, forty-three miles. The extraordinary repair work under contract done the past fiscal year and settled is \$336.35 ; unsettled, \$84,790 ; remaining to complete, \$113,955. The work done as miscellaneous repairs, not under contract, amounts to \$15,477.17.

Every difficulty heretofore encountered in the construction of the Minetto dam has been surmounted and the work closed. It was built for 247 feet from the east end in the summer of 1868, and seventy feet beyond where it could be protected in mid river was washed away, and the rock bed dug down several feet the following winter.

In 1869, a season of high water, it was only advanced 147 feet from the west shore, and at that point secured. The center portion, now 120 feet, became more cut down in the foundation, both for the dam and apron, the next winter. In the summer of 1870 the masonry part was carried across the 120 feet, all that could be done; and in 1871 the apron for 209 feet to close up, forty-one feet having also been washed out, was put in. The extra work at the east end, extending the shore-abutment down stream, authorized by the Canal Board August 24, 1869, has also been done. The high dam, the last one of the seven forming the slack-water navigation of the Oswego river, has progressed very favorably. The lock-head and bulkheads at the west end are in and complete, except the coping. The west spillway abutment, so far as covering the old dam, is also complete except the coping, but has still to be extended both up and down stream. The twenty-foot cribs, sunk to the rock in twenty feet water, are in for two-thirds the way across, filled, finished, and the whole capped over with apron timbers sixty feet long. Should rock be found all the way across, as is expected now, the dam, when done, cannot fail to be a permanent and perfectly reliable structure. The raising of low banks has been confined wholly to the Minetto river level, and is now complete. Piles have been driven and protections made on the Oneida river, as contemplated by the law of 1870. Also some protections afforded to the berme bank above the Horseshoe dam. Navigation has been uninterrupted, except what was incidental to a few sunken boats and their removal.

## CHENANGO CANAL.

### REPAIR SECTION No. 1.

This section extends from Utica to the foot of lock 81, one mile south of Hamilton, thirty-one miles, and embraces Madison brook, Woodman's pond, Leland's pond, Bradly brook, Hatch's lake, Kingsley brook and Eaton brook reservoirs, together with fourteen miles of feeder, making the total length of canal and feeders forty-five miles. The work done as extraordinary repairs under contract and settled, amounts to \$5,440; unsettled, \$46,960; and there remains to be done to complete, \$2,061. The report of last year contained the following: "In the absence of any appropriation or legislative direction, the undersigned has felt a certain degree of embarrassment in determining upon the course to pursue in relation to the threatened failure of so many of the old locks. Former reports have all called attention to them, and yet nothing has been done to authorize the work or the pay

for it except as an ordinary repair. Should one utterly fail at any time during the navigable season, the canal would be closed for a considerable time. However, so long as he was charged with the responsibility of maintaining and keeping up the navigation, he determined upon the partial reconstruction of four of the poorest, to wit, locks 17, 27, 47 and 51. The work is to be done under the direction of the superintendent of repairs upon this section, and preparation is now being made to perform the work this winter."

The Commissioner is placed in the same position again; there has been neither appropriation nor legislative direction given. There are two more failing locks on this section, Nos 7 and 9, and I am compelled, for the purpose of maintaining navigation another year, to order the superintendent to rebuild them this winter. There were several waste-weirs rebuilt last winter, and a contract has been made for an iron bridge at Bouckville, which will be put up another season. One of the discharge pipes of the Madison brook reservoir at Hamilton failed, and has been useless for many years. There were never but two, and only nine inches in diameter, so that with but one in order, the reservoir was of but little use. An appropriation had been made to put in new pipes, and after considerable examination and consultation with the engineers, it was decided upon as being the best plan to abandon the old pipes and the old location and bank them up, and put in two new sixteen-inch pipes in a new place. The work has been started and will be so far advanced this fall as to allow the reservoir to refill.

#### REPAIR SECTION No. 2.

Extends from the foot of lock 81 to and including the first farm bridge above lock 100, thirty-four miles. There are also six feeders, with an aggregate length of four miles, making the total length of the canal and feeders thirty-eight miles. There has been no extraordinary repair work done on the section this year. The amount done as miscellaneous repairs, not under contract, amounts to \$2,057. There are three locks on this section that have been reported against from year to year for several years past. The only reason, aside from the want of an "appropriation" and "legislative direction," for not rebuilding them so far, is, that there are still worse ones, in other places, needing overhauling first. The aqueducts generally are in a deplorable state, some with failing walls, some undermined, or partly so, and all wanting new timber trunks. There must be considerable work done to some of them before another opening. Many of the smaller structures will also demand extensive repairs.

## REPAIR SECTION No. 3.

Extends from, and including the first farm bridge above lock 100, to the city of Binghamton, thirty-two miles, and embraces the Stratton and Chenango Forks feeders. The amount of work done as extraordinary repairs, under contract, settled, is \$12,837.42; unsettled, \$52,780; and remaining to be done, \$5,887.50. The amount done as miscellaneous repairs, not under contract, is \$1,580.41.

As indicated in the report of last year, locks 101, 107, 108 and 110 were taken down and rebuilt, ready for the opening in the spring. The culvert near lock 101, with the water running under, instead of through it, was repaired, and is again as permanent as ever. There have been swing bridges, on what is known as the "Winckler patent," built, under special laws, at Henry street, Binghamton, and Genesee street, Greene, and an iron bridge at Court street, Binghamton. The old iron superstructure taken down at Genesee street, Greene, has been put up at Jackson street, a bridge a short distance north. The aqueduct at Page brook is in quite a precarious condition. It became undermined some years since, the walls broke in two, and the foundation settled. Although it stands there now, yet it is liable at any time of high water to be entirely broken down, perhaps carried away.

## CAYUGA AND SENECA CANAL.

This canal extends from the Erie, at Montezuma, to Seneca lake, at Geneva, with a branch from lock 9 to Cayuga lake; total, twenty-three miles.

The work done for the fiscal year as extraordinary repairs, under contract and settled, is \$17,091.50. Unsettled, \$8,520, and remaining to complete, \$14,889.10. The amount done as miscellaneous repairs, not under contract, is \$1,210.18.

The work of protecting the berme bank at Geneva, along the shore of Seneca lake, under the increased appropriation of last winter, is now mainly done, and will doubtless stop any further encroachment of the lake upon the canal. Iron needle beams have been put into a bridge, and the vertical wall building last year, both at Seneca Falls, have been completed, and the accounts closed. There were \$5,000 appropriated in 1869, and reappropriated in 1871, for taking out original material in the river bottom above Waterloo. After expending most of the money in dredging all that could be dredged, the balance was found to be rock, which cannot be got out without coffer-dams and bailing. More appropriation should be made and the work done, as without it, when Seneca lake gets low, as was the case this sum-

mor, the draft of boats has to be decreased, by resolution of the Canal Board, to get over it. The obstruction at Free bridge, for which there was an appropriation of \$500, was taken out last spring by the superintendent. There is a plan out for a new stone dam at Waterloo, arranged with bulk-heads and gates for drawing down the high water. This will have a most salutary effect upon all the State works above Waterloo, docks and piers at Geneva, Dresden and Watkins, in saving them from injury. The plan should be fostered, appropriations increased which are now inadequate, and the work speedily done.

#### CAYUGA INLET.

It was shown last year that the appropriation of 1869 would be exhausted, and the work of "constructing a tow-path, dredging the inlet, confining Fall creek to its proper channel, repairing the old and constructing a new pier to prevent the accumulation of bars, and to regulate the passage of the water at the mouth of the inlet," would not be perfected without a farther appropriation of at least \$15,000. Act chapter 715, Laws of 1871, did appropriate the farther sum of \$12,500 to be expended under the direction of the Canal Commissioner in charge. The old contract has been closed, and a new one let to extend the pier about 200 feet, and dredge the inlet and harbor for seven feet at lowest water, and the work is now going on.

#### CHEMUNG CANAL.

This canal extends from the head of Seneca lake, at Watkins, to Elmira, including the feeder from Horseheads, to Knoxville, thirty-nine miles. The work done for the fiscal year as extraordinary repairs, under contract and settled, amounts to \$10,500.59; unsettled, \$15,120; and remaining to complete, \$14,474.20. The amount done as miscellaneous repairs, not under contract, is \$73,790.42.

Last year's report contained a very minute description of the break in the dam on the Chemung river, at Gibson. It was completely finished late in the fall, and now stands perfect so far as the present structure is concerned. A somewhat minute description was given in that report of the surroundings, the want of increased spillway on account of larger floods, as the country becomes cleared up; to all of which you are respectfully referred. New bridge abutments have been put up at one of the main streets in the village of Horseheads, under a special law, and the iron superstructure taken down in the alteration of Court street bridge at Binghamton, transported and put up. There are five old-style swing bridges on

streets on a short stretch at the terminus of this canal at Elmira, to wit: At Second, Church, Fifth, Cross, and Gray streets. These bridges are all a failure, and if rebuilt should be on the plan of the "Winckler patent." It is said, however, that the terminus of the canal covering these bridges is no longer useful or necessary; that the boatmen and the people have transferred their business to a new point. If this be so, it may be better economy for the State to fill up the canal and cede the land to the city in lieu of building and perpetuating bridges of any kind.

A contract for extending a breakwater at Watkins has been made in conformity to a law of last winter; also for iron bridges at Havana and Watkins. The aqueduct above lock 43 has so far failed that it will have to be rebuilt; and, for its better security, should be placed on a pile foundation. There was a delay of seven days to the navigation last spring by a bar of gravel washing into the feeder at Gibson; otherwise it has been continuous. A recurrence of the washing in of gravel again is not likely to occur, as since that time there has been two dams built above to catch it as it comes down in flood times.

#### CROOKED LAKE CANAL

Extends from Dresden, a port on Seneca lake, to the Crooked lake at Penn Yan, eight miles. There has been no extraordinary repair work done this year. There is under contract, and to be done, \$1,691. The amount done as miscellaneous repairs, not under contract, is \$67,943.63.

Locks 8, 9, 10, 11, 18 and 19, were rebuilt last winter, under precisely the same circumstances as those on repair section No. 1, of the Chenango canal, to wit, without appropriation or legislative direction, and, therefore, as an ordinary repair. The Commissioner did not feel willing to take the chances of an utter failure of any one of them so long as he was charged with the responsibility of maintaining and keeping up the navigation. They were built through the superintendent of repairs at a cost a little below the average, \$10,108.57 each. The work was well done; the locks are tight and present a good appearance generally. The lock at Dresden, at the outlet into Seneca lake, has been lengthened under a special law, chapter 930, Laws 1871, and some brush and stone protection to banks, under chapter 778, paid for. On the 28th of March last, a contract was made for bottoming down the lake level at Penn Yan, but the contractor gave it no attention, and the superintendent was obliged to do some work before the opening. The contract work is



to be done this winter. Crooked lake has been the lowest this year ever known. Boats drawing over two and a half feet could not move. Considerable dredging and clearing out is needed to perfect the navigation into the lake. Locks 14 and 20 are now the worst and need rebuilding.

### ONEIDA LAKE CANAL.

Nothing has been done by the contractors this year, to forward their contracts on account of the smallness of the appropriation last winter. The Commissioner, in order to secure some exposed crib work at the lake, has had the stone filling finished, and to save the materials has constructed a bridge and put the lock-gates into the locks. The work has been paid for out of the appropriation, through the contractors, proper. It is estimated that it will still cost \$100,000 to complete this canal, the same as reported last year, and if suspended another year, will cost yet more, as the loss on materials delivered, running in of partly constructed and exposed banks and walls is all the while going on; and in replacing them, inevitably swells the ultimate cost.

### CHENANGO CANAL EXTENSION.

The following statement will show the condition of the work on this canal at the end of the present fiscal year, September 30, 1871:

Work under contract .....	\$1,986,339 95
Work not under contract.....	368,773 00

Total.....	\$2,355,112 95
Total cost reported last year .....	2,215,319 08

Increase .....	\$139,793 87
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This increase of cost, resident engineer

McAlpine explains as follows: "The estimates now contain an item for four iron railroad bridges, crossing over the canal at Binghamton, never before entered".....\$45,000 00

Again, "owing to the frequent suspensions of the work for want of funds, and the small annual appropriations, many of the sections that were completed from time to time, will now, after from three to five years of exposure and disuse, require repairs more or less extensive, which, in the aggregate have been estimated at .....

33,000 00

78,000 00

Leaving .....	\$61,793 87
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to be attributed to a general increase of quantities on completing the work. The most economical State work is that which is the most rapidly done, and the soonest brought into use. The expenditure has all been confined to the portion between Binghamton and Owego. There remains now of work to be done to fully complete it..... \$243,424 33  
To complete from Owego to the Pennsylvania State line, 628,651 61

Total..... \$872,075 94

#### REMOVING OBSTRUCTIONS FROM THE CAYUGA OUTLET AND SENECA RIVER.

There seems to be an implied intention, to say the least, on the part of the Legislature, to appropriate money to perfect what is known as the work of "removing obstructions from the Cayuga outlet and Seneca river," as may be seen by referring to acts chapters 179, Laws of 1858; 465 of 1862; 304 of 1868; and 492 of 1870; but they all fail in the most essential particular, to wit, an appropriation of money that can be reached and used. This matter was discussed last year. There is some unfinished work for which an appropriation should be made, the precise nature of which may have been lost sight of, to a degree. It is for completing the opening of a new water-way from the Clyde river, or Canandaigua outlet, to, under and below the aqueduct across the Seneca river, on the Cayuga marshes at Montezuma; the object being to fully compensate for having turned the said Clyde river or Canandaigua outlet from its natural course, and to prevent any back-water on lands above the said aqueduct growing out of the want of it. This work has never been fully completed according to its original design and plan; it having been arrested from the want of sufficient appropriations to carry it out. There has latterly been sought to be coupled with it another measure, "the draining of the Cayuga marshes." Of course, the draining of the marshes would incidentally help this object, if it were done; but this, confined to its own legitimate purpose, and for no other purpose, would not help that.

Respectfully submitted.

M. S. KIMBALL,  
*Division Engineer.*

NOTE.—This report not having been completed till the first of January, I am able to bring the above statement down to that time.

Cost to complete from Binghamton to Owego, January 1, 1872 ..... \$178,000 00  
Cost to complete from Owego to Pennsylvania State line ..... 628,651 61  
Total..... \$806,651 61

TABLE No. 1.

*STATEMENT of engineering upon repairs of Middle Division of New York State Canals, together with incidental expenses for the fiscal year ending September 30th, 1871.*

## ERIE CANAL.

NAME.	Rank.	No. of days.	Rate of compensation.	Amount.	Totals.
M. S. Kimball .....	Division engineer .....	Salary ..	\$3,400	\$600 00	\$1,725 00
M. S. Kimball .....	Division engineer .....	Travel ..		210 00	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	725 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..		190 00	
INCIDENTAL EXPENSES.					
Stationery .....				\$200 91	
Postage, telegraph and express .....				263 32	
Fuel and light .....				51 25	
Miscellaneous .....				250 40	764 88
Total for Erie canal .....					\$2,489 88

## CAYUGA AND SENECA CANAL.

M. S. Kimball .....	Division engineer .....	Salary ..	\$3,400	\$155 00	\$624 00
M. S. Kimball .....	Division engineer .....	Travel ..		75 00	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	800 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..		94 00	
Total for Cayuga and Seneca canal .....					\$624 00

## CROOKED LAKE CANAL.

M. S. Kimball .....	Division engineer .....	Salary ..	\$3,400	\$200 00	\$394 00
M. S. Kimball .....	Division engineer .....	Travel ..		67 00	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	100 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..		27 00	
INCIDENTAL EXPENSES.					
Stationery .....				\$14 61	14 61
Total for Crooked Lake canal .....					\$408 61

## CHEMUNG CANAL.

M. S. Kimball .....	Division engineer .....	Salary ..	\$3,400	\$425 00	\$1,086 00
M. S. Kimball .....	Division engineer .....	Travel ..		162 00	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	350 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..		99 00	
INCIDENTAL EXPENSES.					
Stationery .....				\$35 14	
Postage, telegraph and express .....				19 54	54 68
Total for Chemung canal .....					\$1,090 68

## OSWEGO CANAL.

M. S. Kimball .....	Division engineer .....	Salary ..	\$3,400	\$345 00	\$1,450 28
M. S. Kimball .....	Division engineer .....	Travel ..		348 96	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	195 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..		61 32	
INCIDENTAL EXPENSES.					
Stationery .....				\$18 10	
Postage, telegraph and express .....				28 87	
Fuel and light .....				6 60	
Miscellaneous .....				25 00	78 57
Total for Oswego canal .....					\$1,528 85

TABLE No. 1—(Continued).

## CHENANGO CANAL.

NAMES.	Rank.	No. of days.	Rate of compensation.	Amount.	Totals.
M. S. Kimball .....	Division engineer .....	Salary ..	\$2.400	\$175 00	\$675 00
M. S. Kimball .....	Division engineer .....	Travel ..	.....	80 00	
Howard Soule, Jr .....	Resident engineer .....	Salary ..	2,000	380 00	
Howard Soule, Jr .....	Resident engineer .....	Travel ..	.....	90 00	
INCIDENTAL EXPENSES.					
Stationery.....				\$42 86	53 76
Postage, telegraph and express.....				10 90	
Total for Chenango canal.....					\$728 76
Total repairs Middle Division..					\$6,870 78

TABLE No. 1—(Continued).

*STATEMENT of Assistants employed upon ordinary and extraordinary repairs during the fiscal year ending September 30th, 1871, and paid by the Canal Commissioner under act chapter 447, Laws of 1865.*

NAME.	Canal.	No. of days.	Rate of compensation.	Amount.	Total.
Denison Richmond .....	Erie.....	313	\$5 00	\$1,565 00	
W. D. Dunning .....	Erie.....	20	5 00	100 00	
M. J. Dolph .....	Erie.....	313	5 00	1,565 00	
J. V. Norton .....	Erie.....	93	5 00	465 00	
E. L. Luddington .....	Erie.....	79	4 50	355 50	
E. L. Luddington .....	Erie.....	234	4 00	936 00	
George S. Field .....	Erie.....	65	4 50	292 50	
Barney Becker .....	Erie.....	157	4 00	628 00	
Alexander Everts .....	Erie.....	140	4 00	560 00	
C. R. Breed .....	Erie.....	105	4 00	420 00	
J. V. Norton .....	Erie.....	230	4 00	880 00	
A. V. Meeker .....	Erie.....	42	3 50	147 00	
					\$7,914 00
B. J. Kimball .....	Oswego .....	79	4 00	\$316 00	
C. E. Smith .....	Oswego .....	234	4 00	936 00	
Joseph Wilbur .....	Oswego .....	166	3 50	581 00	
Isaac Thorp .....	Oswego .....	158	3 00	474 00	
C. R. Breed .....	Oswego .....	129	4 00	516 00	
H. H. Coats .....	Oswego .....	236	4 50	1,062 00	
George Briggs .....	Oswego .....	26	3 00	78 00	
					3,963 00
D. E. Whitford .....	Chemung and Crooked Lake..	313	5 00	\$1,565 00	
Calvin Shelton .....	Chemung and Crooked Lake..	313	4 00	1,252 00	
H. T. Beach .....	Chemung and Crooked Lake..	234	4 00	936 00	
H. R. Wright .....	Chemung and Crooked Lake..	26	3 00	78 00	
O. H. Wright .....	Chemung and Crooked Lake..	79	3 00	237 00	
H. R. Wright .....	Chemung and Crooked Lake..	44	4 00	176 00	
George E. Runyan .....	Chemung and Crooked Lake..	63	4 00	252 00	
					4,496 00
John T. Herrick .....	Cayuga and Seneca .....	254	5 00	\$1,270 00	
H. T. Beach .....	Cayuga and Seneca .....	79	4 00	316 00	
L. H. Hopkins .....	Cayuga and Seneca .....	47	4 50	211 50	
					1,797 50
William V. Van Rensselaer .....	Chenango .....	313	5 00	\$1,565 00	
Charles A. Beach .....	Chenango .....	100	5 00	500 00	
Charles D. Smith .....	Chenango .....	115	3 00	345 00	
J. W. Clark .....	Chenango .....	153	4 00	612 00	
Warren Post .....	Chenango .....	69	4 00	276 00	
H. M. Race .....	Chenango .....	175	4 00	700 00	
A. J. Hackley .....	Chenango .....	30	4 00	80 00	
					4,078 00
H. R. Wright .....	Chemung .....	79	3 00	\$237 00	
O. H. Wright .....	Chemung .....	155	3 00	465 00	
D. P. Dey .....	Chemung .....	158	4 00	632 00	
George E. Runyan .....	Chemung .....	49	4 00	196 00	
Peter B. Russell .....	Chemung .....	43	3 00	129 00	
					1,659 00
					\$23,907 54

*STATEMENT of engineering upon construction of Oneida Lake canal, together with incidental expenses, for the fiscal year ending September 30th, 1871.*

NAME.	Rank.	No. of days.	Rate of compensation.	Amounts.	Totals.
H. D. Brockway .....	Leveler .....	313	\$4 50	\$1,408 50	
F. G. Kelsey .....	Rodman .....	313	3 50	1,095 50	
Simon L. Briggs .....	Axman .....	313	2 50	782 50	
H. C. Lower .....	Inspector .....	79	3 50	276 50	
INCIDENTAL EXPENSES.					\$3,563 00
Stationery .....				\$34 78	
Postage and telegraph .....				9 67	
Office rent, fuel and light .....				80 82	
Miscellaneous .....				75	
					126 02
Total Oneida lake canal..					\$3,689 02

*STATEMENT of engineering upon construction of Otisco Lake reservoir for the fiscal year ending September 30th, 1871.*

NAME.	Rank.	No. of days.	Rate of compensation.	Amounts.	Totals.
Charles A. Sweet .....	Assistant engineer .....	220	\$5 00	\$1,100 00	
					\$1,100 00
Total Otisco lake res'r...					\$1,100 00

*STATEMENT of engineering and incidental expenses upon the extension of the Chenango canal, for the fiscal year ending Sept 30th, 1871, as authorized by act, chapter 185, Laws of 1864.*

NAME.	Rank.	No. of days.	Rate of compensation.	Amounts.	Totals.
C. L. McAlpine .....	Resident engineer .....	Salary	\$2,000 00	\$2,000 00	
C. L. McAlpine .....	Resident engineer .....	Travel		417 90	
O. F. Whitford .....	Assistant engineer .....	313	5 50	1,721 50	
T. Goodsell .....	Assistant engineer .....	102	5 50	561 00	
C. A. Beach .....	Assistant engineer .....	26	5 50	143 00	
J. S. Killaly .....	Draftsman .....	156	4 50	702 00	
J. S. Killaly .....	Asst. engineer & draftsman ..	157	5 00	785 00	
F. Leach, Jr. ....	Leveler .....	313	4 50	1,408 50	
G. S. Field .....	Leveler .....	30	4 50	135 00	
T. J. Bristol .....	Tapeman .....	156	3 25	507 00	
T. J. Bristol .....	Rodman .....	157	4 00	628 00	
F. Farrington .....	Tapeman .....	102	3 25	331 50	
J. S. Thorn .....	Flagman .....	153	3 75	420 75	
J. S. Thorn .....	Tapeman .....	157	3 25	510 25	
J. W. Clark .....	Tapeman .....	14	3 25	45 50	
J. W. Clark .....	Rodman .....	79	4 00	316 00	
L. L. Johnson .....	Axman .....	138	2 50	345 00	
J. Hanrahan .....	Axman .....	6	2 50	15 00	
H. Odell .....	Inspector .....	105	4 00	420 00	
C. H. Sweet .....	Inspector .....	105	4 00	420 00	
G. H. Sawyer .....	Inspector .....	52	4 00	208 00	
R. Botts .....	Inspector .....	72	3 00	216 00	
J. H. Decker .....	Superintendent of work .....	18	5 00	90 00	
INCIDENTAL EXPENSES.					\$12,346 90
Labor .....				\$35 75	
Stationery .....				122 12	
Fuel .....				83 18	
Light .....				50 80	
Office rent .....				354 00	
Postage and telegraph .....				71 04	
Miscellaneous .....				55 24	
					771 13
Total Chen. canal exten.,					\$13,118 03

## SUMMARY OF TABLE No. 1.

Engineering proper for the whole division .....	\$6,870 78
Engineering for repairs, ordinary and extraordinary ..	23,907 50
Engineering for the construction of the Oneida Lake canal .....	3,689 02
Engineering for the construction of Otisco Lake reservoir .....	1,100 00
Engineering for the Chenango canal extension .....	13,118 03
	<u>\$48,685 33</u>

TABLE No. 2.  
*STATEMENT of work under contract upon the Middle Division of the New York State Canals, for the fiscal year ending September 30, 1871.*  
 ERIE CANAL.

CHARACTER OF WORK.	Appropriation.	When let.	When to be completed.	Engineer's estimate.	Estimated cost at contract prices.	Amount done during fiscal year.	Total amount done.	Amount remaining to be done.	Remarks.
Otisco Lake reservoir.	\$42,000	Oct. 1, 1868	Ap'l 20, 1869	\$42,000 00	\$43,000 00	\$700 00	\$41,640 00	\$1,360 00	Settled.
Improvement Owasco Lake outlet.	21,500	July 22, 1868	Jan. 1, 1869	21,500 00	16,461 45	3,561 45	16,461 45	2,800 00	Settled.
Raising berm bank near lock No. 50.	10,000	July 14, 1869	Dec. 1, 1869	10,000 00	8,925 00	4,880 00	4,880 00	2,600 00	Settled.
Filling packet boat basin at Syracuse.	3,000	July 14, 1869	Dec. 1, 1869	3,000 00	3,000 00	1,340 00	2,400 00		
Protecting highway, etc., at De Ruyter reservoir.	9,000	July 14, 1869	Dec. 1, 1869	9,000 00	8,425 00	3,330 00	7,380 00	1,045 00	
Rebuilding iron bridge at Warren street, Syracuse.	20,000	July 14, 1869	Dec. 1, 1869	20,000 00	18,963 00	10,600 00	16,160 00	2,803 00	
Rebuilding iron bridge at Lock street, Syracuse.	7,000	July 14, 1869	Dec. 1, 1869	7,000 00	8,660 00	1,080 00	8,660 00		Belongs to repair cont.
Straightening Chittenango Creek channel.									Belongs to repair cont.
Removing waste-weir at Cowasselon creek.	78,995	April 7, 1870	April 1, 1871	78,995 00	78,965 00	55,065 00	76,880 00	2,115 00	Contract of Canal Com'r.
Removing wall benches on Jordan level.	30,000	July 14, 1869	April 1, 1870	30,000 00	30,000 00	12,140 00	29,440 00	560 00	
Removing wall benches on Syracuse level.	28,000	July 14, 1869	April 1, 1870	28,000 00	28,000 00		14,640 00	13,360 00	Settled.
Rebuilding wall benches on Long level.	3,600	Sep. 23, 1869	April 1, 1870	3,600 00	3,880 82	360 82	3,880 82		
Rebuilding culvert near Burdick's bridge.									
Well and receiver at discharge weigh-lock sewer.	11,000	Sep. 23, 1869	April 1, 1870	11,000 00	11,000 00			11,000 00	Contract not perfected.
Bottoming down, east of Lock No. 47.	45,000								Given to repair contract act c. 877, Laws of 1869.
Inserting iron needle beams in bridge at Chittenango.	1,430	Aug. 3, 1870	Sep. 1, 1870	1,430 00	1,078 53	1,078 53	1,078 53	Settled.	
Rebuilding of iron turnpike bridge over feeder at Orville.	1,560	Aug. 3, 1870	Nov. 1, 1870	1,560 00	1,172 90	1,172 90	1,172 90	Settled.	
Inserting iron needle beams in bridge at Centerport.	1,500	Aug. 3, 1870	Sep. 1, 1870	1,500 00	1,079 26	1,079 26	1,079 26	Settled.	
Slope wall on towing-path side Nine-mile Creek feeder.	6,000	Aug. 3, 1870	May 1, 1871	6,000 00	3,397 50	330 00	330 00	3,077 50	
Over-fall and paved waste at outlet, De Ruyter reservoir.	12,742	Aug. 3, 1870	Nov. 1, 1870	11,500 00	6,143 00			6,143 00	
Raising Geddes road at Syracuse.	22,500	Aug. 3, 1870	Nov. 1, 1870	22,500 00	17,616 00	4,360 00	4,360 00	13,256 00	
Bridges on repair, section No. 9.	1,900	June 19, 1871	Oct. 1, 1871	1,900 00	890 00	890 00	890 00	30 00	Contract of Canal Com'r.
Vertical wall at Cuykendall's.	1,500	Jan. 23, 1871	Ap'l 25, 1871	1,500 00	1,235 54	1,235 54	1,235 54	Settled.	
Removing wall benches and substituting slope or vertical wall on the Long level.		Jan. 23, 1871	Ap'l 25, 1871	30,000 00	20,180 00			20,180 00	
				\$341,975 00	\$311,603 00	\$103,133 50	\$233,268 50	\$78,394 50	



*Statement — (Continued).*

## OSWEGO CANAL.

[illegible]

## CAYUGA AND SENECA CANAL.

	July 14, 1869	April 1, 1870	\$37,000 00	\$31,893 53	\$31,893 53	Settled.
Rebuilding locks Nos. 2, 3, 9, 11.....	\$37,000					
Dredging channel, etc., at Cayuga inlet, at Ithaca.....	15,000	Sep. 23, 1869	13,000 00	11,000 84	11,000 84	Settled.
Iron bridge at Ovid street, Seneca Falls.....	7,000	Sep. 23, 1869	6,800 00	6,540 51	6,540 51	Settled.
Swing-bridge near lock No. 11.....	2,070	Mar. 8, 1870	2,070 00	1,451 17	1,451 17	Settled.
Protecting berme bank along shore of Seneca lake.....	10,000	Aug. 4, 1871	9,000 00	6,960 00	6,960 00	\$2,040 00
Iron needle beams in bridge at Seneca Falls.....	2,500	July 6, 1871	2,500 00	1,809 10	1,809 10	\$729 90
Vertical wall at Seneca Falls.....	5,600	Nov. 23, 1870	5,600 00	5,586 45	5,586 45	Settled.
Extending pier 900 feet and dredging harbor at Ithaca.....	13,500	July 6, 1871	13,500 00	12,600 00	12,600 00	12,600 00
Total.....			\$36,470 00	\$79,920 60	\$65,031 50	\$14,889 10

## CHEMUNG CANAL.

	Sep. 23, 1869	Sep. 1, 1870	15,300 00	10,732 21	10,732 21	Settled.
Dredging from lock No. 1 to Seneca lake.....	15,000					
Cleaning out State ditch on farm of M. Sayre & Co.....	4,700	July 14, 1869	4,700 00	4,367 90	4,367 90	Settled.
Rebuilding and extending breakwater at Watkins.....	20,000	Aug. 2, 1870	20,000 00	16,575 00	12,860 00	3,715 00
Taking up old lock and constructing culvert, etc., at Elmira.....	7,000	Aug. 2, 1870	7,000 00	4,094 48	4,094 48	Settled.
Bridge abutments at Watkins.....	2,000	June 19, 1871	2,000 00	2,260 00	2,260 00	20 00
Extending breakwater and dredging harbor at Watkins.....	15,000	July 25, 1871	15,000 00	9,259 20	9,259 20	5,740 80
Iron bridge at Havana.....	2,000	June 19, 1871	2,000 00	1,480 00	1,480 00	550 00
Total.....			\$66,000 00	\$48,718 79	\$34,244 59	\$14,474 20

## CROOKED LAKE CANAL.

	Mar. 28, 1871	April 25, 1871	\$2,000 00	\$1,691 00	\$1,691 00	
Bottoming canal level at Penn Yan.....	2,000					

*STATEMENT showing engineer's estimated cost at contract prices, estimated cost at prices fixed under Laws of 1869 and 1870, amount done and remaining to be done, and amount done during fiscal year ending September 30th, 1871.*

ONEIDA LAKE CANAL.

CHARACTER OF WORK.	Amount appropriated.	When let.	When to be completed.	Engineer's estimate.	Estimated cost at old contract prices, from original estimated quantities.	Estimated cost at old contract prices, from present estimated quantities.	Estimated cost at prices fixed by Canal Board and board of Canal Commissioners under Laws of 1869 and 1870.	Amount done during fiscal year.	Total amount done.	Amount remaining to be done.
Section No. 1.....	\$371,153 47	Dec. 18, 1867	July 1, 1869	\$306,000 00	\$32,500 00	\$37,000 00	\$50,000 00	.....	\$37,960 00	\$13,040 00
Section No. 2.....		Dec. 18, 1867	July 1, 1869		46,000 00	53,000 00	65,000 00	.....	68,000 00	.....
Section No. 3.....		Dec. 18, 1867	July 1, 1869		56,000 00	64,000 00	74,000 00	1,240 00	53,440 00	20,560 00
Section No. 4.....		Dec. 18, 1867	July 1, 1869		55,500 00	66,000 00	96,000 00	2,000 00	79,600 00	16,400 00
Section No. 5.....		Dec. 18, 1867	July 1, 1869		68,000 00	94,000 00	138,000 00	14,740 00	113,040 00	14,960 00
Totals.....	\$371,153 47	.....	.....	\$306,000 00	\$258,000 00	\$314,000-00	\$416,000 00	\$23,080 00	\$332,040 00	\$63,960 00

TABLE No. 2—(Continued).  
EXTENSION OF THE CHENANGO CANAL.

Length in chains.	CHARACTER OF WORK.	Appropri- ation.	When let.	When to be completed.	Engineer's estimate.	Estimated cost at con- tract prices.	Amount done dur- ing fiscal year.	Total amount done.	Amount remaining to be done.	Remarks.
62	Section No. 1.....	...	June 22, '65	Sept. 1, '66	\$7,878 89	\$7,878 89	.....	\$7,878 89	.....	Canceled October, 1867.
62	Section No. 1.....	...	July 29, '68	April 1, '70	14,600 00	11,711 93	.....	11,711 93	.....	Completed.
33	River bank or tow-path section	...	July 14, '69	Nov. 1, '70	9,318 31	9,318 31	\$453 31	9,318 31	.....	Canceled October, 1867.
71	Section No. 2.....	...	June 22, '65	Sept. 1, '66	29,086 37	29,086 37	.....	29,086 37	.....	Relet.
80	Section No. 3.....	...	July 29, '68	April 1, '70	63,000 00	62,374 60	3,422 44	62,374 60	\$12,032 16	Canceled October, 1867.
80	Section No. 3.....	...	June 22, '65	Sept. 1, '66	30,355 72	30,355 72	.....	30,355 72	.....	Canceled Nov. 1869, and attached to section 4.
80	Section No. 3.....	...	July 29, '68	April 1, '70	6,020 89	6,020 89	.....	6,020 89	.....	Canceled October, 1867.
80	Section No. 4.....	...	June 22, '65	Sept. 1, '66	40,523 61	40,523 61	.....	40,523 61	.....	Relet.
80	Section No. 4.....	...	July 29, '68	April 1, '70	100,000 00	99,994 72	29,143 72	91,503 72	8,491 00	Canceled October, 1867.
90	Section No. 5.....	...	June 22, '65	Sept. 1, '66	57,485 02	57,485 02	.....	57,485 02	.....	Relet.
90	Section No. 5.....	...	July 29, '68	April 1, '70	29,900 00	30,100 36	9,915 36	29,140 36	3,960 00	Canceled October, 1867.
90	Section No. 6.....	...	June 22, '65	Sept. 1, '66	39,227 81	39,227 81	.....	39,227 81	.....	Relet.
90	Section No. 6.....	...	July 29, '68	April 1, '70	10,593 89	10,593 89	.....	10,593 89	.....	Canceled June, 1869.
80	Section No. 6 and part of 7...	...	July 14, '69	Nov. 1, '70	45,880 00	45,288 87	23,388 87	40,688 87	4,600 00	Completed.
80	Section No. 7.....	...	June 22, '65	Sept. 1, '66	43,065 00	43,796 85	.....	31,726 85	.....	Completed.
80	Section No. 7.....	...	June 22, '65	Sept. 1, '66	21,185 00	29,626 93	.....	29,626 93	.....	Completed.
80	Section No. 9.....	...	June 22, '65	Sept. 1, '66	12,745 00	19,427 52	.....	19,427 52	.....	Completed.
80	Section No. 10.....	...	June 22, '65	Sept. 1, '66	6,692 62	6,692 62	.....	6,692 62	.....	Canceled October, 1867.
80	Section No. 10.....	...	July 29, '68	April 1, '70	13,100 00	15,556 29	.....	15,556 29	.....	Completed.
76	Section No. 11.....	...	Feb. 7, '66	Sept. 1, '67	30,650 00	28,048 89	.....	28,048 89	.....	Completed.
81	Section No. 12.....	...	Feb. 7, '66	Sept. 1, '67	17,050 00	18,500 86	.....	18,500 86	.....	Completed.
80	Section No. 13.....	...	Feb. 7, '66	Sept. 1, '67	12,130 00	8,284 47	.....	8,284 47	.....	Completed.
80	Section No. 14.....	...	Feb. 7, '66	Sept. 1, '67	13,080 16	13,080 16	.....	13,080 16	.....	Canceled October, 1867.
80	Section No. 14.....	...	July 29, '68	April 1, '70	10,210 00	9,222 72	.....	9,222 72	.....	Completed.
80	Section No. 15.....	...	Feb. 7, '66	Sept. 1, '67	9,008 86	9,008 86	.....	9,008 86	.....	Canceled October, 1867.
80	Section No. 15.....	...	July 29, '68	April 1, '70	10,850 00	6,939 80	.....	6,939 80	.....	Completed.
80	Section No. 16.....	...	Feb. 7, '66	Sept. 1, '67	22,650 00	13,455 68	.....	13,455 68	.....	Canceled Oct. 1867.
82	Section No. 17.....	...	Feb. 7, '66	Sept. 1, '67	18,430 45	18,430 45	.....	18,430 45	.....	Completed.
82	Section No. 17.....	...	July 29, '68	April 1, '70	25,700 00	13,946 98	.....	13,946 98	.....	Canceled October, 1867.
88	Section No. 18.....	...	Feb. 7, '66	Sept. 1, '67	36,311 34	26,311 34	.....	26,311 34	.....	Canceled June, 1870.
80	Section No. 18.....	...	July 29, '68	April 1, '70	46,068 00	46,068 00	.....	46,068 00	.....	Completed.
80	Section No. 19.....	...	Feb. 7, '66	Sept. 1, '67	10,650 00	11,280 50	.....	11,280 50	.....	Completed.
80	Section No. 20.....	...	Feb. 7, '66	Sept. 1, '67	40,632 23	39,777 23	.....	39,777 23	.....	Canceled October, 1867.
80	Section No. 21.....	...	June 15, '66	May 1, '67	10,590 46	10,590 46	.....	10,590 46	.....	Completed.
80	Section No. 21.....	...	July 29, '68	April 1, '70	44,700 00	44,320 94	.....	44,320 94	.....	Completed.
79	Section No. 22.....	...	June 15, '66	May 1, '67	65,100 00	76,271 86	.....	76,271 86	.....	Completed.
85	Section No. 23.....	...	June 15, '66	May 1, '67	12,050 00	29,219 55	.....	29,219 55	.....	Completed.
79	Section No. 24.....	...	June 25, '66	May 1, '67	9,369 30	9,369 30	.....	9,369 30	.....	Canceled.

TABLE No. 2 — (Continued).

Length in chains.	CHARACTER OF WORK.	Appropriation.	When let.	When to be completed.	Engineer's estimate.	Estimated cost at contract prices.	Amount done during fiscal year.	Total amount done.	Amount remaining to be done.	Remarks.
79	Section No. 24	.....	Nov. 11, '69	Nov. 1, '70	\$45,000 00	\$30,972 50	.....	.....	\$30,972 50	Relet.
82	Section No. 25	.....	June 15, '69	May 1, '70	8,496 79	2,136 70	.....	.....	.....	Relet.
83	Section No. 26	.....	Nov. 11, '69	Nov. 1, '70	92,000 00	2,112 66	.....	.....	.....	Relet.
84	Section No. 27	.....	June 25, '69	May 1, '70	108,455 66	108,455 66	\$14 65	.....	6,977 35	Relet.
85	Section No. 28	.....	June 15, '69	May 1, '70	108,455 66	108,455 66	.....	.....	.....	Relet.
86	Section No. 29 and 27	.....	Sept. 23, '69	Nov. 1, '70	79,000 00	64,402 00	.....	.....	42,339 52	Relet.
87	Section No. 30	.....	June 25, '69	May 1, '70	16,700 00	16,700 00	.....	.....	16,700 00	Relet.
88	Section No. 31	.....	June 15, '69	May 1, '70	10,910 01	10,910 01	.....	.....	10,910 01	Relet.
89	Section No. 32	.....	Nov. 11, '69	Nov. 1, '70	5,405 28	5,405 28	.....	.....	5,405 28	Relet.
90	Section No. 33	.....	Feb. 11, '70	April 1, '71	94,000 00	10,750 00	.....	.....	.....	Relet.
91	Section No. 34	.....	Feb. 11, '70	April 1, '71	17,650 00	10,886 00	.....	.....	.....	Relet.
92	Section No. 35	.....	Feb. 11, '70	April 1, '71	19,300 00	10,107 00	.....	.....	.....	Relet.
93	Section No. 36	.....	Feb. 11, '70	April 1, '71	18,400 00	10,605 00	.....	.....	.....	Relet.
94	Section No. 37	.....	Feb. 11, '70	April 1, '71	23,600 00	12,574 00	.....	.....	.....	Relet.
95	Section No. 38	.....	Feb. 11, '70	April 1, '71	23,850 00	15,913 00	.....	.....	.....	Relet.
115	Section No. 39	.....	Feb. 11, '70	April 1, '71	25,950 00	15,353 00	.....	.....	.....	Relet.
136	Raising towing-path on sections Nos. 12, 13, 16, 29 and 28	.....	Feb. 11, '70	April 1, '71	80,735 00	59,198 00	.....	.....	59,198 00	Relet.
.....	Lock No. 1	.....	July 14, '69	Nov. 1, '70	13,081 86	12,081 86	201 86	.....	.....	Relet.
.....	Lock No. 2	.....	June 23, '65	Sept. 1, '66	1,933 78	1,933 78	.....	.....	.....	Relet.
.....	Lock No. 3	.....	June 23, '65	Sept. 1, '66	2,376 90	2,376 90	.....	.....	.....	Relet.
.....	Lock Nos. 1 and 3	.....	June 23, '65	Sept. 1, '66	1,773 50	1,773 50	.....	.....	.....	Relet.
.....	Lock No. 4	.....	Nov. 11, '69	Nov. 1, '70	31,730 00	35,694 00	.....	.....	32,570 60	Relet.
.....	Lock No. 5	.....	Feb. 7, '66	Sept. 1, '67	4,457 34	4,457 34	.....	.....	.....	Relet.
.....	Lock No. 6	.....	July 14, '69	Nov. 1, '70	13,000 00	11,000 00	2,258 55	.....	.....	Relet.
.....	Lock No. 7 and 8	.....	July 14, '69	Nov. 1, '70	13,995 00	13,979 16	.....	.....	.....	Relet.
.....	Chocant aqueduct.	.....	Sept. 23, '69	Nov. 1, '70	30,000 00	23,879 00	4,370 85	.....	.....	Completed.
.....	Chocant aqueduct.	.....	Feb. 7, '66	Sept. 1, '67	31,000 00	23,879 00	1,749 19	.....	.....	Completed.
.....	Apalachin aqueduct.	.....	July 14, '69	Nov. 1, '70	42,000 00	17,007 16	.....	.....	.....	Completed.
.....	Apalachin aqueduct.	.....	Feb. 7, '66	Sept. 1, '67	35,000 00	35,918 05	13,600 55	.....	.....	Completed.
.....	Archibald aqueduct.	.....	Nov. 11, '69	Nov. 1, '70	15,000 00	9,097 00	.....	.....	.....	Completed.
.....	Culverts on sections Nos. 1 to 5	.....	June 23, '65	Sept. 1, '66	444 44	444 44	41 60	.....	.....	Completed.
.....	Culverts on sections Nos. 6 to 10	.....	June 23, '65	Sept. 1, '66	12,511 40	12,511 40	.....	.....	.....	Completed.
.....	Culverts on sections Nos. 11 to 20	.....	Feb. 7, '66	Sept. 1, '67	17,738 85	17,738 85	.....	.....	.....	Completed.
.....	Culverts on sections Nos. 1 to 20	.....	July 29, '69	April 1, '70	32,250 00	32,250 00	7,292 28	.....	.....	Completed.
.....	Culverts on sections Nos. 21 to 30	.....	June 15, '66	May 1, '67	55,000 00	52,443 00	583 56	.....	.....	Completed.
.....	Bridges on sections Nos. 1 to 5	.....	June 23, '65	Sept. 1, '66	4,113 40	4,113 40	.....	.....	.....	Completed.

[illegible]

TABLE No. 3.

STATEMENT of authorized work upon miscellaneous repairs under the supervision of the engineering department for the fiscal year ending September 30, 1871.

## ERIE CANAL.

CHARACTER OF WORK.	How authorized.	Appropriation on engineer's estimate.	Amount done.	Amount paid.	Remarks.
Protecting banks on section No. 7 by realling with brush and stone.....	By Commissioner upon change of plan..	\$5,387 80	\$6,373 80	\$5,387 80	To refill with earth deducted.
Bottoming canal, east of lock No. 47.....	Act chapter 877, Laws of 1869.....	5,000 00	408 80	408 80	Earth above original bottom deducted.
Removing cast-iron culvert and building	By Commissioner under repair contract.	3,671 30	6,086 68	3,671 30	Materials furnished by State deducted.
Structures at Coveselon Creek channel.....	By Commissioner under repair contract.	2,374 40	2,374 40	2,374 40	.....
Vertical wall between Salina and Warren street	By Commissioner under repair contract.	6,134 77	7,487 77	6,134 77	Materials furnished by State deducted.
Bridges, Syracuse lock No. 49, Syracuse.....	By Commissioner under repair contract.	1,413 57	1,413 57	1,413 57	.....
Vertical wall above lock No. 49, Syracuse.....	By Commissioner upon change of plan..	2,039 47	2,039 47	2,039 47	.....
Iron bridge at Onondaga.....	By Canal Commissioner, c. 87, Laws of 1870.	1,041 65	1,041 65	1,041 65	Old structure deducted.
Durhamville.....	By Canal Commissioner, through sup't.	1,622 46	1,622 46	1,622 46	.....
Culvert and bridge embankment, Port Byron.....		\$29,446 41			

## OSWEGO CANAL.

Iron bridge at Durston's dry dock, Syracuse.....	By Commissioner upon change of plan..	\$525 90	\$525 90	\$525 90	Old structure deducted.
Iron bridge at Bear street, Syracuse.....	By Commissioner upon change of plan..	3,056 28	3,331 00	3,056 28	Old structure deducted.
Driving piles at Caughtenoy and Schroepfel.....	By Commis's under c. 767, Laws of 1870.	4,026 17	4,026 17	4,026 17	.....
Opening State ditch between Mud lock and Liverpool.....	By Commis's under c. 767, Laws of 1870.	3,750 00	3,750 00	3,750 00	.....
Repairing and strengthening berms bank at Horse-shoe dam.....	By Commis's under c. 767, Laws of 1870.	11,451 00	11,451 00	11,451 00	.....
Vertical wall on Syracuse level of Oswego canal.....	By Commis's under c. 767, Laws of 1870.	9,902 59	9,902 59	9,902 59	.....
Vertical wall near Bradley brook.....	By Commis's under c. 767, Laws of 1870.	3,188 00	3,188 00	3,188 00	.....
		\$36,369 76			

## OHENANGO CANAL.

Bridge abutments at Jackson street, Greene.....	By Canal Commissioner through sup't..	\$1,471 75	\$1,471 75	\$1,471 75
Moving superstructure from Genesee street.....	By Canal Commissioner through sup't..	108 66	108 66	108 66
Iron bridge at Mitchell street, Norwich .....	By Canal Commissioner, authorized by Canal Board, Dec. 8, 1870.....	2,087 00	2,087 00	2,087 00
			\$3,687 41	

## CAYUGA AND SENECA CANAL.

Protecting bank at Seneca lake, Geneva.....	By Canal Com'r, chap. 778, Laws of 1871.	\$1,210 18	\$1,210 18	\$1,210 18
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## CHEMUNG CANAL.

Repairing dam at Gibson.....	By Canal Commissioner, as a break .....	\$64,264 26	\$64,264 26	
Removing old bridge superstructure and building new stone abutments at Horseheads.....	By Canal Com'r, chap. 878, Laws of 1870.	4,779 00	4,983 00	4,779 00
Transporting superstructure from Court street, Binghamton, and putting up at Horseheads.....	By Canal Com'r, chap. 878, Laws of 1870.	990 66	990 66	990 66
Protecting banks of Mill creek.....	By Canal Commissioner through sup't..	2,090 00	2,090 00	2,090 00
Extra dredging below lock No. 1.....	By Canal Commissioner through sup't..	1,452 50	1,452 50	1,452 50
			\$73,790 42	
				Old structure deducted.

## CROOKED LAKE CANAL.

Brush and stone protection to banks.....	By Canal Com'r, chap. 778, Laws of 1871.	\$2,800 00	\$2,800 00	\$2,800 00
Rebuilding locks Nos. 8, 9, 10, 11, 18, 19 .....	By Canal Commissioner through sup't..	60,651 44	60,651 44	60,651 44
Bottoming down lake level at Penn Yan .....	By Canal Commissioner through sup't..	1,813 28	1,813 28	1,813 28
Strengthening lake lock at Dresden .....	By Canal Com'r, chap. 880, Laws of 1871.	2,678 91	2,678 91	2,678 91
			\$67,943 63	



TABLE No. 4.

*STATEMENT showing the work not under contract.*

## EXTENSION OF CHENANGO CANAL.

CHARACTER OF WORK.	Engineer's estimate.	Remarks.
Section No. 18.....	\$16,000 00	
Repairing sections Nos. 8 to 17 and 19 to 23 inclusive.....	17,000 00	
Four wooden locks, including guard-lock.....	81,573 00	
Wappasena aqueduct.....	25,000 00	
Little Wappasena aqueduct.....	20,000 00	
Ellis aqueduct.....	25,000 00	
Culverts on sections Nos. 31 to 38 inclusive.....	38,000 00	
Railroad bridges at Binghamton.....	45,000 00	
Bridges, Binghamton to Owego.....	47,000 00	
Bridges on sections Nos. 31 to 38 inclusive.....	44,200 00	
Total.....	\$368,773 00	

## SUMMARY.

*Amount of work done during the fiscal year.*

CANAL.	Work under contract.	Work upon miscellaneous repairs.	Totals.
Erie, including Otisco Lake reservoir.....	\$108,153 50	\$29,446 41	\$132,599 91
Oswego.....	121,548 87	86,259 76	157,808 18
Chenango.....	118,017 42	8,637 41	121,654 88
Chenango extension.....	105,638 92		105,638 92
Chemung.....	25,624 59	78,790 42	99,415 01
Crooked Lake.....		67,943 63	67,943 63
Cayuga and Seneca.....	25,611 50	1,210 18	26,821 68
Oneida Lake (enlargement).....	21,280 00		21,280 00
	\$520,874 30	\$212,287 81	\$733,162 11

Cleaning out creeks and ditches.....		308 46	308 46
Dams.....		142 17	142 17
Slope and vertical wall....	224 00	724 62	948 62
Docking.....		1,113 04	1,113 04
Watching canal.....		1,452 33	1,452 33
Tools.....	123 05	737 88	860 96

## WESTERN DIVISION.

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CANAL COMMISSIONERS' OFFICE, }  
ROCHESTER, Dec. 9, 1871. }

The undersigned, Commissioner in charge, presents the following as his annual report of the Western Division of the canals of this State for the fiscal year ending September 30, 1871.

This division embraces that portion of the Erie canal extending from the east line of Wayne county to the city of Buffalo, including all the works connected therewith; also the Main and Hamburg Street canal, the Clark and Skinner canal, and the basins and slips connected with the Erie and said canals in said city.

Length of main line.....	149 miles.
Also the Genesee Valley canal, extending from the Erie canal at Rochester to Olean, in the county of Cattaraugus,	107 miles.
The extension from Olean to the Allegany river at Mill Grove pond.....	6 miles.
And the branch extending from the Shakers' to Dansville,	11 miles.

Total length of main lines of canals on this division,.. 273 miles.

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There are also seventeen miles of feeders, three miles of which are navigable, and three reservoirs, to wit, Ischua, Oil creek, and Rockville.

### ENGINEER DEPARTMENT.

This department has, during the past year, been under the charge of Daniel Richmond, division, and J. Nelson Tubbs, resident engineers, and their assistants employed in said department.

Their duties have been to survey, plan and prepare for letting, works authorized by the Legislature, and to supervise the construction thereof, and make monthly estimates for the monthly payments thereon, and final estimates on all works completed. They have also rendered such assistance as was required in the repairs and management of the canals and navigation, and, in addition thereto, have made the surveys for, and the maps requisite to, the hearing of claims before the Canal

Appraisers. Their time and services have been fully occupied in the discharge of these duties, and they have discharged them with a care, promptness and fidelity worthy of commendation.

#### SUPPLY OF WATER.

This division of the Erie canal is supplied with water from Lake Erie, through Black Rock harbor, from Tonawanda creek at Pendleton, from Tonawanda and Oak Orchard creeks at Medina, from the Genesee Valley canal and Genesee River feeder at Rochester. The main supply is, however, obtained from Lake Erie, and is ample for the purpose; but owing to the manner in which the canal has been constructed in that vicinity, connected as it is with Black Rock harbor, there is difficulty, during low stages of water in the lake, in bringing it forward through the guard-lock at lower Black Rock. Such has been the case during the past season, and especially so since the 1st of August last, the lake having been from eighteen to twenty-six inches lower than usual, and the guard-lock at Black Rock having stood wide open most of the time; and even then, the level extending thence to Lockport did, on one or two occasions, get too low for navigation on certain portions thereof, while a man was constantly employed to look after the water in said harbor and vicinity, and control the use thereof (under lease from the State) by the mills in that locality. It seems, and such is the opinion of the engineers, boatmen and practical men, necessary that the canal should be made independent of the harbor, and of width sufficient to bring its own supply through its own channel, from the lake to the head of the guard-lock at Black Rock, as the only effectual means of remedying this difficulty.

The water which passes in mill-races around the locks at Lockport is also used under a perpetual lease from the State, and after such use, is again discharged into the canal below said locks; such use, to the extent required for feeding the canal east thereof, is no more detrimental to navigation than if the same amount was passed without such use. But when used in excess of such requirements, an increase of velocity is occasioned proportional to such excess, which may, and does at times, prove unfavorable to navigation. Under the present state of things, the only remedy as against an excess of use, is the care and watchfulness that may be exercised by the agents of the State in charge of the locks and feed-gates at that place, in so controlling it from day to day during the season of navigation as will best subserve the public interest, by maintaining the levels both

above and below said locks at the requisite height for the most favorable navigation, all things considered, on the plan of canal as the same now is and has been constructed in that vicinity.

The Genesee Valley canal is supplied with water from the following sources: Allen's creek, at Scottsville; Genesee river, at Mount Morris; Canaseraga creek, at Woodville; Mill creek, at Dansville; Wiscoy creek, at Mixville; Genesee river feeder, at Oramel; Rockville reservoir, at Rockville; Oil creek reservoir, at Cadysville; Champlain and Griffin's creeks, at Cuba; Ischua feeder, near south end of summit; Oil creek feeder, near Hinsdale; Dodge and Haskell creeks, and the Allegany river, on the extension, between Olean and Millgrove pond.

The present sources of supplies are deemed ample for all parts of said canal, except the southern two miles of the Dansville branch, which has not at all times a sufficiency of water.

The engineers have examined, and find that the additional water required for said two miles can be obtained from Loon lake, distant from Dansville some ten (10) miles, and is the cheapest and most available source for such supply, and will not exceed in cost \$10,000, to turn the water of said lake into the channel of Mill creek, and bring it thence into the canal at Dansville by the present dam and feeder at that place.

#### APPOINTMENTS OF SUPERINTENDENTS AND GENERAL CONDITION OF NAVIGATION.

There are on this division nine subdivisions or superintendents' sections, five of which, to wit: Nos. 10, 11, 12, 13 and 14, are on the Erie and four, to wit: Nos. 1, 2, 3 and 4, on the Genesee Valley canal.

On the 27th and 28th days of January last, the Canal Board appointed the following named persons superintendents, and assigned them in charge of the several sections named below, to take effect on the 1st of February, 1871:

William F. Ashley.....	Section No. 10, Erie canal.
Matthew Rigney.....	Section No. 11, Erie canal.
Lewis M. Loss.....	Section No. 12, Erie canal.
William McKae.....	Section No. 13, Erie canal.
James Mooney.....	Section No. 14, Erie canal.
F. M. Mills.....	Section No. 1, Genesee Valley canal.
James Lemen.....	Section No. 2, Genesee Valley canal.
W. A. Kirkpatrick.....	Section No. 3, Genesee Valley canal.
John L. Adams.....	Section No. 4, Genesee Valley canal.

The above named superintendents are still in charge of the sections then assigned them.

In anticipation of an early opening of the upper lakes and probable receipts of large quantities of grain at Buffalo, the undersigned consulted the board of trade of that place as to when the canals should be opened, and received from them, in reply, that "the 20th of April, or as soon thereafter as practicable." Consequent, the Board of Canal Commissioners did, by resolution, appoint April 24, 1871, as the time for opening the canals of the State.

This division would have been in complete readiness by that time, except sections 2, 3 and 4 of the Genesee Valley canal, which, were somewhat delayed by repairs necessary to be made, but for a small break which occurred on the seventeen mile level, east of Rochester, on the morning of the 24th of April, which caused that level to be drawn off, thereby cutting off the feed east of there. This break was repaired in the next twenty-four hours, and the level commenced filling again and was nearly full, when on the night of the 28th of April the great break at the Oxbow embankment occurred. This embankment is named from the shape of the old canal at that place, having been somewhat in form of an ox-bow, while the enlarged canal was formed by making a single embankment across the extreme ends of the bow, crossing a valley or depression some twenty-five feet below bottom line of canal, and flowing the bend of the bow, making a pond of some thirty acres. This pond can't be drawn below said line so long as the embankment stands.

The water stood in said pond all last winter to the height of the bottom of the canal at each end of said embankment. The bank was to all appearance sound and good above, as well as below said line, and at least eighteen inches in height, above high water mark, and at least two feet above the water when the breach occurred. It is quite evident to my mind that said break was caused by some evilly disposed person, or party. It occurred in the highest and heaviest part of the bank and where its base must have been at least 165 feet broad; a clean breach was made through the bank, over 100 feet in length to its entire base, and for several feet in depth below the natural soil. The bench bank, on the inner face of the main bank, was also, carried away and washed off entirely in places, and at others only in part, for several feet below the natural ground in said pond, extending nearly 1,000 feet westerly, and 700 to 800 feet easterly from the main breach, all which had to be restored to resume navigation. It was a formidable breach in its extent and magnitude, and the material for repairing it remote, the earth therefor having to be hauled some 1,800 feet from the westerly, and 2,200 to 2,500 feet from the easterly side. Large

preparations were necessary to accommodate the great force of men and teams requisite to its performance in the shortest practicable time, in the way of provisions, large sheltering, cooking, feeding and sleeping accommodations for the men, and also for feeding and protecting the horses, building roads, planking them where soft, and erecting shanties, barns, tents, etc., but all was accomplished, and the level filled so that light boats passed the breach on Wednesday the 10th day of May, only twelve days after it occurred, while parties had telegraphed through the country that it would not be repaired in thirty days.

The 180 or more loaded boats going east, had all passed Rochester by the evening of the 14th of May; and some of the up boats which had been detained by the break, had then arrived at Buffalo.

Since then, and for the balance of the season, but little interruption to navigation has been occasioned from any cause, and boats have moved with more precision, rapidity, and regularity, than at any time heretofore; and the season has been a very favorable and prosperous one to the boatmen generally.

Some boats have made seven round trips from Buffalo to New York (notwithstanding the interruption at the start and the early close), which has heretofore been an unusual occurrence during a season as short as the last has in reality been. These facts and the testimonials of boatmen over their own signatures who use these works, are the best evidences of their condition and management. The boatmen also say that the navigation has been improved from year to year during the last four years, and that it was better during the past year than for ten years previous, although the season has been unusually dry, and all the streams of the country reduced comparatively to mere rivulets.

A further fact may be stated in this connection; that more tonnage has passed over the canals during the past four years than during any other four consecutive years since their existence; and the tonnage of the past season is in excess of the tonnage for any previous year.

## REPAIRS OF ERIE CANAL.

### SECTION No. 10.

WILLIAM F. ASHLEY, *Superintendent.*

This section is thirty-five miles in length and extends from the east to the west line of Wayne county. The repairs have been made by William Mudgett, attorney of Benjamin Butler, as repair contractor

at the annual compensation of \$34,000. This contract expires by its terms on the first day of January next.

The mechanical structures on this section are as follows: One double lift lock; eight single lift locks; thirteen iron truss road bridges; nineteen wood road, two wood road and change, one wood farm and change, and eight wood farm bridges; two waste-weirs; three composite and nineteen stone culverts; two wooden trunk aqueducts; eight lock and nine watch-houses, and one workshop and shed.

Previous to opening of navigation last spring, material was excavated from prism of canal between Pit lock and Clyde, through the village of Clyde, east of Lock Berlin, through and east of the village of Lyons, through village of Newark and Palmyra, through the village of Macedon, and at Wayneport.

The locks, including gates, miter-sills, etc., were put in complete working order. The composite valves in all the locks, except the berme lock at upper Macedon were removed, and wrought-iron valves and fixtures of a new pattern put in their place. The towing-path at various places was graveled, and considerable coping timber, secured with ties, was placed upon vertical walls during the season. The waste-weir at Lock Berlin was partially rebuilt last spring, but gave out again during the season, owing to fault in original plan, and its being located in a quicksand marsh. This waste-weir should be rebuilt on a change of plan and at a new location, several hundred feet either east or west of the present one.

A new iron bridge has been constructed at Leach's mill in the village of Lyons, and iron beams in place of wood beams, and new timber work in bridges at Palmyra, Port Gibson, and Macedon. The bridges are now in excellent condition. Some new gates and mitre-sills will be required in the locks, and considerable bottoming and raising of banks at various points, together with some riprap protection, next season. The doubling of the locks has been progressed during the season, and the three at Lockville will probably be brought into use the coming spring.

The cost of repairs for fiscal year ending September 30th, 1871, has been \$34,000.

#### SECTION No. 11.

MATHEW RIGNEY, *Superintendent*.

This section is forty miles in length, and extends from the east line of Monroe county to the west end of construction section No. 284, in the village of Brockport, and includes the Genesee river feeder,

and structures connected therewith, and the towing-path bridge across the Genesee Valley canal at its junction with the Erie canal. It is under contract with Valentine F. Whitmore, to be kept in repair at the annual compensation of \$43,500. The said contract will expire on the first day of January, 1872.

The mechanical structures on this section are as follows: Five lift locks; one guard-lock (not in use); one weigh-lock; three stop gates; one stop dam; one Genesee river aqueduct; eight waste-weirs; forty-one culverts; one wood farm bridge; one wood foot bridge; thirty wood road bridges; three wood tow-path bridges; one iron tow-path change bridge; twenty-six iron road bridges; one iron swing bridge; three lock-houses; five watch-houses, and one Genesee river dam.

During the season a considerable amount of bottoming was done at various points, but principally between eight mile grocery and west end of section, and between Bushnell's basin and Cartersville. A large amount of vertical wall at Rochester and Brockport was rebuilt. A large amount of new coping timber, secured with ties, was placed upon vertical walls. The waste-weir on three mile level in Brighton was rebuilt. The locks were put in complete working order, some new gates inserted and the older ones repaired and replanked, the mitre-sills repaired or renewed, and such parts of the lining of the chambers as were gone replaced with new. The bridges were maintained in good condition. The weigh-lock and stop-gates were overhauled and repaired. The towing-path was graveled and graded through Perrinton straight from Bushnell's basin to Wapping, from Oxbow to Fulham's basin, through a portion of the city of Rochester, from east end of wide water to four mile grocery, and a portion of the berme bank on the three mile level in Brighton raised and strengthened, and secured with loose stone protection.

No detentions have occurred worthy of record on this section, save the break at Oxbow bank, about one mile west of Fairport.

While filling the seventeen mile level a small breach occurred through the towing-path near the main Oxbow bank, on the 24th of April. This was speedily repaired, and the work of filling again commenced. When the level was nearly filled, again in the night of the 28th of April an immense break occurred through the main towing-path embankment, carrying out the earth to a depth of nearly forty feet. A large force was at once set at work making repairs, and on the 8th day of May, repairs were so far completed, as to admit of again feeding on to the level. It is believed that no breach of equal



magnitude has ever been repaired in so short time on the canals of this State. The bank where the break occurred was one of great and unusual strength, and from the closest inspection seemed to be in every way secure and sound. The disaster is inexplicable on any other theory than that it was purposely caused by evilly disposed persons.

During the present season of navigation there have been indications that considerable repairs will have to be made to the flume bulk-head, cradle and frame for water-wheel at the Rochester weigh-lock. This work can only be done when the water is drawn from the canal, and also at a time when water in the Genesee river is at a low stage.

A serious leak was discovered in the arch culvert at Adam's basin, during the summer. It was checked without drawing the water from the long level, but extensive repairs must be made during the coming winter, it being evident that a portion of the foundation which is said to be on quicksand, has settled, and the arch masonry ruptured.

Slope walls should be constructed at an early day on the high embankment near Cartersville, in place of the present sheet docking.

The arch culvert near Spring House, which has been out of use for many years, should be cut off through the tow-path bank, as it now makes a lead for water, and may at any time prove a source of disaster. It has shown some leakage during the season which every effort has not entirely checked.

There should be considerable dredging done during the coming season through Perrinton swamp, and some excavation on short level, between second and third lock in Brighton, principally in removing original rock near Heart's saw-mill. Wiltsie's road bridge to be rebuilt; two new lock-gates to be inserted in Pittsford, and two in Miller's lock; some new mitre-sills also required.

The cost of repairs for fiscal year ending September 30th, 1871, has been as follows :

Yearly compensation paid contractor.....	\$43,500 00
Paid on account of repairs at Oxbow break.....	53,626 58
Paid on account of land damages, etc.....	1,700 00
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	\$98,826 58
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#### SECTION No. 12.

LEWIS M. LOSS, *Superintendent.*

This section extends from the west end of construction section No. 284 (in Brockport), to the west line of Orleans county, and is thirty miles in length.

The repairs have been done by the State, under the charge of a superintendent. The mechanical structures on this section are as

follows: One wrought-iron swing-bridge; fourteen iron road; eighteen wooden road, and three wooden farm bridges; six waste-weirs; forty-three culverts; one aqueduct; two stop-gates; two bulk-heads and one dam.

In making spring repairs about 3,000 lineal feet of vertical walls at Albion, Medina and Knowlesville were taken up and relaid in a substantial manner, requiring a large amount of new stone to be furnished. The sheet docking on inside face of the high tow-path embankment at Holley was removed and a substantial slope wall constructed in its stead. A large amount of old slope wall at different points on the section was taken up and relaid.

Material was taken from the prism of canal at a large number of places, but the largest quantity at Albion, Medina, Holley, Eagle Harbor and Knowlesville.

About 2,500 lineal feet of coping timbers, secured with ties, have been placed on vertical walls, principally at Albion and Medina.

Four miles of towing-path, east of Albion, and six miles west, have been raised, graded, and ditches constructed to carry off surface water. Four new wood bridges have been constructed, to wit, Lattier's, Brady's, Salisbury's, and Mill bridge. Two iron bridges have been retimbered, namely, Holley and Hall's bridges.

The culvert at Main street, Albion, has been overhauled and secured. The banks of Tonawanda and Oak Orchard creek feeder have been raised, the bulk-head replanked, and dam thoroughly repaired, new gates and rack to waste-weir constructed, and the channel bottomed out.

During next fiscal year, Bidwell's, Beal's, Starkweather's, Tuttle's and Long bridges will require rebuilding. Tuttle's bridge should be built of iron. Iron needle beams should also be inserted in iron bridge over old canal at Holley.

The sheet docking on inside face of embankment at Fish creek culvert should be replaced with slope walls. The usual bottoming will be required at various points on the section, and considerable slope wall should be taken up and relaid. Navigation on this section has been uninterrupted during the year.

The expenditures by the superintendent during fiscal year are as follows:

For new structures.....	\$3,913 80
For ordinary repairs.....	17,121 37

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\$21,035 17

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## SECTION No. 13.

*WILLIAM McRAE, Superintendent.*

This section is twenty-six miles long, and extends from the east line of Niagara county to Pickard's bridge, on Tonawanda creek. The repairs have been made during the year by the superintendent.

The mechanical structures on this section are as follows: Five double combined lift-locks; one guard-lock; one State race and two bulk-heads; one stop gate; twenty-three culverts; four waste-weirs; fifteen wooden road, fifteen iron road, one wood farm, one iron tow-path change, and four wood tow-path change bridges; one lock and tool-house; one workshop, and one timber shed.

Previous to opening of navigation, the combined locks were put in good working order by repairing gates, culvert valves, rods, chains, iron work generally, and replacing lining in chambers, and repairing mitre-sills. A new wooden dock was built between the tow-path bridges at Pendleton, and the dock on berme side at Pendleton repaired, several hundred lineal feet of piles driven to protect the abutments of tow-path bridge at Pendleton. A vertical wall, 300 feet in length, was built on berme side in Lockport, from stone which had fallen into the canal from the rock cut by the action of the frost. About 1,000 cubic yards of vertical walls were rebuilt at Middleport, Orangeport, Lockport, and at various points between Lockport and Pendleton. All bars and loose stone were removed, including several hundred cubic yards of earth which had run into canal from Hodginsville sluice. Sulphur Spring guard-lock gates, rack and fixtures, were also extensively repaired.

During the season of navigation six culvert valves and two lock gates in combined locks were inserted. The culvert under canal at Middleport was cleaned; the covered sluice from State ditch to canal near Sulphur Spring was partly taken up and relaid; a portion of the Hodginsville sluice was taken up and relaid. The large bridge on Main street in Lockport was replanked, and very extensively retimbered. A new flooring was put in Wakeman's bridge. The stone pier of Pickard's bridge was extensively repaired and secured. The approaches of several bridges were raised. Baker's farm bridge was rebuilt, and a new foot bridge at Lockport constructed, and many of the bridges on the section were replanked, and some of the roadways entirely new timbered. About 80,000 feet, b. m., of docking timber, secured by ties, has been placed upon vertical wall at various points. Considerable graveling has been done on the section, and the tow-path graded and ditched.

Navigation has been uninterrupted, except for a period of twenty-four hours, occupied by inserting new gates in combined locks, which had been carried out.

The usual cleaning out of bars, stone, and other deposit, will be required previous to opening of navigation next spring. Three new gates will be required in combined locks, which gates are framed and ready to be inserted.

The expenditures by the superintendent during the fiscal year are as follows:

For new work or structures.....	\$4,529 01
For ordinary repairs.....	33,679 13
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	\$38,208 41
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#### SECTION No. 14.

JAMES MOONEY, *Superintendent*.

This section is nineteen miles long, and extends from Pickard's bridge over Tonawanda creek to the city of Buffalo, including the Main and Hamburg Street, and Clark and Skinner canals, Erie and Ohio basins and their slips, and Black Rock harbor. This section is now under contract with George D. Lord for repairs, at the annual compensation of \$44,400.

The mechanical structures on this section are: Twenty-four iron road bridges; two iron swing-bridges; three iron change bridges; six wood road and farm, three wood tow-path and two wood tow-path draw-bridges; three culverts; two spillways; one dam and bulk-head; one river lock; one guard-lock and feed gates; one ship lock; Erie basin break-water; Black Rock pier; stone jetty pier at entrance of Erie basin; and pile jetty pier at entrance of Black Rock harbor.

The more important repairs made on this section during the year, have been the graveling a large portion of the towing-path, repairing and securing vertical wall at various points, renewing nearly all the timber docking on Tonawanda creek, and protecting the same with riprap walls, securing pile docking at Tonawanda, and on the Clark and Skinner canal. Constructing towing-path bridge in Buffalo, framing and preparing farm bridge on section No. 365 and guard lock gate at Black Rock, dredging under the bridges in Buffalo and at various other points on section, repairing and securing banks and walls around Black Rock harbor, and other work of various kinds to maintain navigation.

The principal repairs required next season are as follows: Rebuilding Hamilton street bridge at Black Rock, constructing a small

amount of slope wall over Cornelius creek culvert, the usual yearly repairs of slope wall between Black Rock and Tonawanda, strengthening bank between Black Rock harbor and Niagara river, repairing division wall between Grand Trunk railroad crossing and Ferry street, reconstructing tow-path and berme docking between State ditch culvert and Tonawanda, and considerable dredging between Erie and York streets in Buffalo.

The water in Lake Erie from the first of August, to the end of the fiscal year, was unprecedentedly low, being almost continually from nineteen to twenty-six inches below the ordinary height. As a consequence the navigation has been seriously embarrassed, as it was found almost impossible with all the feed and lock-gates open at Black Rock, to send forward a sufficient amount of water to keep up the levels east to Montezuma. The result of this low water and the heavy draft east, was to create so rapid a current through the narrow canal between the New York Central railroad bridge and Ferry street, as to render its navigation difficult and dangerous. This difficulty was seriously aggravated by the abstraction of water for the use of the mills at Black Rock. These difficulties must be eventually remedied by the construction of an independent canal channel of greater width and depth through the whole harbor, and the deepening of the canal channel between Erie and York streets in Buffalo, below the originally established bottom line.

The cost of repairs on this section for the fiscal year was, \$44,400.

## REPAIRS OF GENESEE VALLEY CANAL.

### SECTION No. 1.

FREDERICK M. MILLS, *Superintendent.*

This section is fifty-two miles long, extending from the junction with the Erie canal at Rochester to the terminus of the side-cut at Dansville, including the feeders at Scottsville, Woodsville and Dansville.

The mechanical structures are as follows: Nineteen lift locks; one guard-lock; four dams; three bulk-heads; eight aqueducts; seven waste-weirs; fifty-six culverts; fifty-six wood farm bridges; one wood farm and change bridge; thirty-three wood road bridges; two wood road and change bridges; two wood tow-path bridges; nine iron road bridges; thirteen lock-houses and one workshop.

This section was in charge of John H. Jones, superintendent, from the commencement of the fiscal year up to the first day of February,

since which time it has been in charge of Frederick M. Mills, superintendent.

Navigation opened on the 26th day of April, and has been uninterrupted during the season except upon the Dansville side-cut, where there has been some detention on account of an insufficient supply of water.

The bridges on Adams and Atkinson streets, in the city of Rochester, which were under contract at date of the last report to be rebuilt of iron, have been completed and brought into use. A new culvert has been constructed by contract and brought into use near Moscow landing.

The feeder dam at Scottsville, which was in progress of being rebuilt at date of the last report, has been completed. Six wood farm and four wood road bridges have been built during the fiscal year. Nearly all the old wood bridges have received more or less repairs.

The wood towing-path bridge connected with the "Squakie Hill" road bridge across the Genesee river near Mt. Morris has received extensive repairs. Several new lock-gates have been built and inserted and the old ones thoroughly repaired; one new lock-house has been built at the old guard, now lift-lock near the Rapids.

The old lock house at the former location of old mud lock has been made into a workshop and store-house.

The road bridges at Canawaugus and Cumminsville, have been put under contract to be rebuilt of iron, and the east abutment of the Genesee river dam at Mt. Morris is also under contract, to be rebuilt of stone in place of wood.

Expenditures by superintendents during fiscal year :

#### NEW WORK OR STRUCTURES.

Lock-gates.....	\$5,247 09
Farm bridges (wood) .....	2,484 31
Road bridges (wood) .....	2,507 26
Lock-houses .....	202 11
Dams.....	970 56
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	\$11,411 33
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#### ORDINARY REPAIRS.

Repairing locks .....	\$3,481 41
Lock tending.....	3,020 91
Repairing lock-gates.....	1,130 68
Repairing aqueducts.....	911 36
Repairing waste-weirs .....	222 20
Repairing farm bridges .....	3,028 90

Repairing wood road bridges .....	\$2,768 94
Repairing iron road bridges .....	573 34
Repairing wood tow-path bridge.....	4,033 38
Repairing State scows .....	1,044 00
Repairing ice-breakers.....	66 28
Repairing steam dredge.....	21 47
Repairing lock-houses .....	1,552 70
Repairing workshops .....	168 25
Raising and repairing banks.....	4,889 01
Cleaning out bottom of canal.....	10,296 14
Cleaning out creeks .....	2,935 79
Repairing dams.....	277 04
Repairing slope and vertical walls .....	3,533 93
Repairing docking .....	1,864 36
Repairing breaches.....	80 00
Watching canal.....	1,324 36
Wheel-barrows .....	102 59
Tools, etc .....	661 31
Miscellaneous .....	1,552 04
Other work of consequence.....	4,352 42
Superintendents salary, etc.....	1,500 00
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	<b>\$55,392 81</b> <hr/>

The cost of repairs on this section for the past fiscal year has been as follows :

Expended by superintendents for new work, or structures .....	\$11,411 33
Expenses by superintendents for ordinary repairs.....	55,392 81
Paid by Commissioner for superintendence of State dredge .....	208 00
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	<b>\$67,012 14</b> <hr/>
Inventory of boats, tools, etc., and materials on hand ..	<b>\$6,920 00</b> <hr/>

## SECTION No. 2.

JAMES LEMEN, *Superintendent.*

This section is twenty-four miles in length, extending from the junction at the Shaker settlement to the south bank of the Wiscoy feeder, including said feeder.

The mechanical structures upon this section are as follows: Fifty-two lift-locks; four aqueducts; six waste-wiers; one dam and bulk-head; twelve culverts; seventeen wood farm bridges; sixteen wood road bridges; two iron road bridges; four wood road and change bridges; one wood tow-path bridge; one wood foot bridge; one

wooden trunk; one overflow spillway; one workshop; nine lock-houses and thirteen watch-houses.

The berme side of wood locks Nos. 14 and 40 were dug out, the sides pressed back and secured and the embankment replaced; the embankment to several of the other locks that had become washed by breakage around same have been replaced. Total cost, \$3,575.22.

The cost of tending the fifty-two locks has been \$11,586.79.

Twenty-five new lock-gates have been built during the fiscal year, and nearly all inserted, at a cost of \$2,677.04.

Nearly all the old gates upon the section have received more or less repairs at a cost of \$1,915.34.

A new trunk has been built to the Wiscoy aqueduct and new sides to the Cashuqua aqueduct at a total cost of \$1,278.67.

Several of the waste-weirs and culverts have received trifling repairs at a cost of \$37.02.

One new wood farm bridge has been built on the nine mile level at a cost of \$285.33

A new wood bridge that had been put up at Blood's has been taken down to give place to an iron bridge which has been built there by contract, and the wood bridge has been converted into a farm bridge at Smith's farm on the nine mile level. This removal, together with extensive repairs to Jacobs', Kingsley's, Fort Hill, Peck's, Elmer's and Dill's farm bridges, has cost \$1,552.51.

Four road bridges have been repaired at a cost of \$637.69.

Three new lock-houses, and three watch-houses have been built; cost \$487.21. Others have been repaired at a cost of \$116.70. One workshop has been built at Nunda; cost \$363.59.

About five miles in length of the towing-path has been raised and graveled, and both banks repaired in sundry places; cost \$3,618.54.

In addition to the removal of bars at the foot of the several locks, considerable bottoming out was done on levels between locks Nos. 11 and 40, and on nine mile level at a cost of \$5,780.40.

On the closing up of the contract for protecting and securing the slide bank at Portage, considerable work remained to be done which devolved upon the superintendent; everything that was necessary has been done to maintain good navigation at that point, and considerable work had been done under the direction of the engineer department to further protect and secure the work. The amount expended at this point is \$5,875.35.

It has been necessary to keep a considerable force of watchmen upon the section both night and day to prevent waste of water, of



which the supply (in consequence of the dryness of the season) has been limited, cost \$2,830.50.

There has been paid for general foreman, labor in overseeing the entire section, and taking care of materials, etc., \$2,292.50.

There has been expended for repairs and fuel for steam dredge, repairs of State scows, cleaning out creek channels and back ditches, tools, wheel-barrows, and other miscellaneous matters, the sum of \$1,707.50.

For superintendent's salary and traveling expenses, \$1,415; for clerk hire, \$900.

Navigation opened on this section on the 5th day of May, and has been interrupted but one day, caused by the breaking of a lock-gate in lock No. 26.

#### SUMMARY OF EXPENDITURES.

Expended by superintendent for new work or structures,	\$4,808 57
Expended by superintendent for ordinary repairs .....	41,809 33
Superintendent's salary, traveling expenses and clerk hire .....	2,315 00
Paid by commissioner for superintendence of State steam dredge .....	352 00
	<hr/>
	\$49,284 90
	<hr/>
Inventory of boats, tools, etc., and materials on hand...	\$10,926 00
Miscellaneous receipts .....	175 59
	<hr/>

The following work should be done prior to the opening of navigation in 1872:

The lining to ten or twelve of the composite locks has become so badly decayed that it will be necessary to replace it with new. At least twenty-five new lock-gates will be required; also quite a number of new wood hollow quoins and mitre-sills.

The wood work to four waste-weirs requires renewing. One wood farm and one road bridge will require rebuilding.

Five lock and three watch-houses should be rebuilt.

Since the close of navigation the north abutment and one pier, together with the trunk resting thereon, of the Portage aqueduct has been washed away by a flood in the Genesee river. This work will have to be replaced; and the expense must necessarily be quite large, owing to the difficult nature of the work, it being necessary, in order to replace the pier and abutment, to coffer-dam against the rapid current of the river; the necessity of doing the work in the winter will

also increase the expense. The balance of the trunk that remains will also require extensive repairs.

### SECTION No. 3.

WILLIAM A. KIRKPATRICK, *Superintendent.*

This section is thirty-two miles in length, extending from the south bank of the Wiscoy feeder at Mixville landing to the west line of Allegany county, including the Genesee river feeder at Oramel, the Cuba reservoir and feeder, the Rockville reservoir and Griffin creek feeder.

The mechanical structures upon the section are as follows: Thirty-five lift-locks; one guard-lock; three aqueducts; seven waste-weirs; twenty-five culverts; two reservoir culverts and wells; two reservoir spillways; twenty-nine wood farm bridges; two wood river road bridges; twenty-seven wood road bridges; three iron road bridges; one wood tow-path and road bridge; one wood road and change bridge; five lock-houses and twelve watch-houses.

The lining of several of the composite locks which had rotted out has been renewed, the stone work that had become pressed in by action of frost has been dressed off, and several new miter-sills have been put in, at an expense of \$1,110.77.

There has been expended for tending thirty-five lift-locks the sum of \$6,337.42.

Sixteen new lock-gates have been made and inserted, at a cost of \$1,678.06.

Nearly all the old gates have received more or less repairs, at a cost of \$686.39.

The aqueducts at Fillmore, Houghton creek and Caneadea have been repaired, at a cost of \$183.70.

The waste-weirs at Cuba and Millett's have been repaired, at an expense of \$81.50.

Culverts below lock No. 80, at Crawford creek and near Mixville have been repaired, at an expense of \$116.80.

Three farm bridges have been rebuilt, at a cost of \$1,248.86.

Repairs of farm bridges have cost \$390.02.

Two new road bridges have been built, at an expense of \$1,021.46.

Repairs of road bridges have cost \$87.66.

The banks have been raised and repaired where needed, and are now in good order; cost \$1,573.46.

Bottoming out was done on a considerable portion of the section, at an expense of \$1,529.94.

The banks and dam at Oramel feeder had, from wear of the flood

waters of the Genesee river, become unsafe, and were protected and secured at a cost of \$368.37.

The dam embankment and outlet to the Cuba reservoir have required considerable repairs, the cost of which have been \$587.23.

The feeder from the Cuba reservoir has been improved, and a new bridge constructed across the same where it enters the canal, at a cost of \$279.25.

One breach occurred during the season at the south end of the Caneadea aqueduct, which caused one and a half days' delay to navigation, and cost to repair \$260.

A considerable force has been required in attending to the waste-weirs, reservoirs and general management of the water, and in watching the banks to guard against breaches; cost \$2,414.

There has been expended for repairs of State scows, cleaning out creek channels, breaking ice and miscellaneous matters, the sum of \$516.31.

For superintendent's salary and traveling expenses \$1,500, and for clerk hire the sum of \$900.

Navigation opened on the fifth day of May, and was uninterrupted except as before mentioned, caused by the breach at Caneadea aqueduct.

#### SUMMARY OF EXPENDITURES.

Expended by superintendent for new work or structures..	\$4,048 38
Expended by superintendent for ordinary repairs.....	16,431 82
Superintendent's salary, etc., and clerk hire.....	2,400 00
	<hr/>
	\$22,880 20
	<hr/>
Inventory of boats, tools, materials on hand, etc.....	\$2,099 25
	<hr/>

Prior to the opening of navigation in 1872, at least ten new lock-gates will be required to be made and inserted, and the lining to four composite locks must be renewed entire, and several of the others extensively repaired.

The side walls of lock No. 77, have been by the action of the frost, forced in, so that there is not sufficient width to admit of the easy ingress and egress of boats, something must be done to obviate the difficulty. It will probably be necessary to take down a portion of the walls and rebuild them in their proper position.

#### SECTION No. 4.

JOHN L. ADAMS, *Superintendent.*

This section is twenty miles in length, extending from the west line of Allegany county to the Allegany river at Millgrove pond.

The mechanical structures upon the section are as follows: Seven lift-locks; two guard-locks; four aqueducts; ten waste-weirs; five culverts; four dams; two bulk-heads; thirteen wood farm bridges; fifteen wood road bridges; one iron road bridge; two wood tow-path; bridges and four lock-houses.

There has been expended for repairs of the several locks, the sum of.....	\$49 60
The lock tending has cost.....	1,552 33
One new farm bridge of wood has been built across the Ischua feeder, at a cost of .....	\$67 45
Repairs of farm bridges have cost.....	53 13
Repairs of road bridges have cost.....	54 64
Both aqueducts upon the extension near Martin's mills have been quite extensively repaired at a cost of.....	660 89
The waste-weir at Haskell and Dodge's creeks on the extension, and the one at Hinsdale, have been repaired at a cost of.....	92 47
There has been expended in raising and repairing the banks which had been badly washed by the spring floods, the sum of.....	687 99
The expense for removing bars and cleaning out bottom of canal has been .....	234 37
For clearing out creek channels.....	52 80
For repairs of Millgrove, oil creek and Ischua dams.....	337 15
For breaking ice and assisting boats in consequence.....	129 85
Two or three small breaches occurred upon the section during the season, causing a delay to navigation of one day, and costing to repair.....	79 70
There has been expended for watching banks, tending waste-weirs and general foreman labor, the sum of....	833 80
For protecting and repairing the road constructed by the State around the Ischua reservoir, the sum of.....	379 49
For repairs of lock-houses, State scows, tools, etc., printing abstracts, office rent, etc., the sum of.....	446 10
For superintendent's salary and traveling expenses .....	1,650 00
For clerk hire.....	975 00

## SUMMARY OF EXPENDITURES.

Expended by superintendent for new work or structures,	\$67 45
Expended by superintendent for ordinary repairs:.....	5,644 31
Superintendent's salary and traveling expenses, and clerk hire.....	2,625 00
	<u>\$8,336 76</u>
Inventory of boats, tools, materials, etc., on hand.....	<u>\$1,752 00</u>

TABLE No. 1.

*Works completed during fiscal year ending Sept. 30, 1871.*

The following works, authorized by the Legislature and Canal Board, have been completed during the fiscal year ending September 30th, 1871, and the final accounts rendered for same.

## ERIE CANAL.

CHARACTER OF WORK.	PAID BY DRAFTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
<i>Ordinary Repairs.</i>			
Cleaning out State ditch at Tonawanda, resolution of Canal Board April 27th, 1869.....	\$1,008 70	.....	\$1,008 70
Total .....	\$1,008 70	.....	\$1,008 70
<i>Extraordinary Repairs.</i>			
Dredging Ohio basin.....	\$339 53	\$17,640 00	\$17,979 53
Extending Black Rock pier .....	3,000 00	5,800 00	8,800 00
Improving and widening canal and constructing vertical wall between Erie and Commercial streets, Buffalo.....	28,896 35	.....	28,896 35
Repairing damages caused by gales and high water of Lake Erie, pursuant to act chapter 787, Laws of 1871 .....	25,000 00	15,000 00	40,000 00
Raising and recoping Black Rock pier .....	780 34	8,700 00	9,480 34
Improving and completing Main and Hamburg Street canal	2,818 53	11,004 28	13,822 80
Dredging channel around north end Erie Basin breakwater	2,741 99	14,140 00	16,881 99
Removing abutments and superstructure of old bridge, and constructing new iron bridge over slip leading to river lock, Tonawanda.....	5,658 98	.....	5,658 98
Removing old warehouse foundation at Black Rock .....	167 43	2,640 00	2,807 43
Reconstructing docking along channel leading to Niagara river, below ship-lock at Black Rock .....	589 95	.....	589 95
Iron bridge over Ohio Basin slip on Fulton street, Buffalo..	689 14	5,140 00	5,829 14
Iron bridge on Georgia street, Buffalo.....	2,828 83	9,140 00	11,968 83
Inserting iron needle beams in bridges on Ferry, Genesee and Michigan Streets, Buffalo.....	9,515 40	.....	9,515 40
Inserting iron needle beams in bridges on Washington street and Hamburg Street canal.....	1,999 53	.....	1,999 53
Sidewalks on Fulton street bridge, Buffalo.....	499 74	.....	499 74
Inserting iron needle beams in two bridges at Clyde, three at Lyons, and two at Newark.....	361 52	4,220 00	4,581 52
Inserting iron needle beams in bridges at Palmyra, Macedon and Port Gibson.....	2,068 55	.....	2,068 55
Inserting iron needle beams in bridges at Comstock's, Adams', Millard's, Hindsburgh and Shelby street .....	2,392 42	4,200 00	6,492 42
Iron bridge at Orangeport.....	3,071 66	.....	3,071 66
Iron bridge at McCartney's .....	2,216 36	.....	2,216 36
Iron bridge at Mabees'.....	2,629 66	.....	2,629 66
Wrought iron swing-bridge at Albion and two iron bridges at Brockville and county line.....	15,071 26	.....	15,071 26
Removing easterly bridge at Palmyra and constructing additional roadway to bridge on Main street.....	1,757 14	8,000 00	9,757 14
Timber bridge over waste-weir channel near Cartersville..	255 29	840 00	1,095 29
Vertical wall at Pendleton.....	3,307 40	.....	3,307 40
Vertical wall at Shelby basin.....	2,773 25	.....	2,773 25
Vertical and slope wall at Eagle harbor.....	2,112 83	.....	2,112 83
Vertical and slope wall at Reynolds' basin.....	1,056 34	.....	1,056 34
Vertical and slope wall between 3d and 4th locks, east of Rochester.....	1,419 89	.....	1,419 89
Additional sluice culvert in town of Lockport.....	2,948 12	260 00	3,208 12
Stop-gate between Deep Hollow culvert and wide water....	9,732 91	.....	9,732 91
Ditch to drain lands of Thomas McGuire.....	1,329 53	.....	1,329 53
Waste-weir on three-mile level in Brighton.....	1,776 80	.....	1,776 80
Improving channel way and discharge culvert of Thomas creek.....	1,437 02	1,620 00	3,057 02
Constructing and testing steam canal dredge.....	8,974 30	15,500 00	19,474 30
Procuring and inserting tile drain in ditch constructed by State on lands of B. F. Sherman, in Clyde.....	400 00	.....	400 00
Total .....	\$147,517 97	\$123,844 28	\$271,362 25
Raising and improving Sulphur Spring guard-lock (abandoned) .....	\$1,496 00	.....	\$1,496 00
	\$1,496 00	.....	\$1,496 00

TABLE No. 1—(Continued).

## GENESEE VALLEY CANAL.

CHARACTER OF WORK.	PAID BY DRAFTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
<i>Extraordinary Repairs.</i>	.		
Slide bank at Portage.....	\$11,187 20	\$67,780 00	\$78,967 20
Raising Oil Creek reservoir.....	3,117 45	127,200 00	130,317 45
Iron bridge over Griffin Creek feeder at Cuba.....	713 45	4,900 00	5,613 45
Iron bridge on State street at Olean.....	493 55	1,780 00	2,273 55
Iron bridge near Blood's farm near Portage.....	1,531 33	.....	1,531 33
Iron bridge on Adams street, Rochester.....	1,426 86	380 00	1,806 86
Iron bridge on Atkinson street, Rochester.....	1,441 87	380 00	1,821 87
Rebuilding guard-bank in town of Hume.....	2,340 56	.....	2,340 56
Completing the widening, deepening and improving Gene- see Valley canal at Rochester.....	40,786 50	48,000 00	88,786 50
Total .....	\$63,088 27	\$250,420 00	\$313,468 27

TABLE No. 2.

*Works in progress at the close of fiscal year ending Sept. 30, 1871.*

The following named works, authorized by the Legislature and the Canal Board, were under contract and in progress at the close of the fiscal year ending September 30, 1871:

## ERIE CANAL.

CHARACTER OF WORK.	PAID BY DRAFTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
<i>Extraordinary Repairs.</i>			
Deepening and improving narrow canal in Black Rock harbor	\$3,600 00		\$3,600 00
Protecting canal against encroachments of Lake Erie.			
Extending, raising and strengthening division bank at lower Black Rock	1,700 00		1,700 00
Removing deposit from Black Rock harbor	11,900 00	\$9,560 00	21,460 00
Crib work and vertical wall on guard-lock section, and cleaning out mill race at Black Rock			
Doubling guard-lock at Black Rock	23,400 00	6,200 00	29,600 00
Constructing guard piers and protecting and securing swing-bridge at Ferry street, in Black Rock harbor.	1,600 00		1,600 00
Constructing pipe sewer along Erie canal to State ditch, Tonawanda	1,300 00		1,300 00
Inserting iron needle beams in bridges at Eagle harbor, and Young's, near Lockport.			
Iron bridge on town line between Greece and Gates			
Iron bridge on Smith street, city of Rochester.			
Iron bridge on section No. 275.			
Iron bridge on tow-path over G. V. C. at junction with Erie canal			
Vertical wall at Bushnell's basin and Cartersville.			
Vertical wall at Fairport.			
Vertical wall and bridge across State ditch at Macedon			
Removing bench walls and constructing slope wall and pavement between Lyons and Lockville			
Raising and improving Sulphur Spring guard-lock (new contract)	24,200 00	12,220 00	36,420 00
Doubling Clyde lock	10,140 00	860 00	11,000 00
Doubling Lock Berlin lock.	8,580 00	6,220 00	14,800 00
Doubling Lyons lock	5,340 00	860 00	6,200 00
Doubling Poor-house lock	15,200 00	1,800 00	17,000 00
Doubling lower lock at Lockville	16,200 00	8,700 00	24,900 00
Doubling middle lock at Lockville.	13,340 00	10,960 00	24,300 00
Doubling upper lock at Lockville	11,100 00	18,200 00	29,300 00
Doubling lower Macedon lock	7,220 00	1,820 00	9,060 00
Doubling Pittsford lock	4,600 00	1,300 00	5,900 00
Doubling Miller's lock.	480 00	3,920 00	4,400 00
Doubling lock No. 3, east of Rochester.	5,180 00		5,180 00
Doubling lock No. 2, east of Rochester.	5,000 00		5,000 00
Doubling lock No. 1, east of Rochester.	6,820 00	3,300 00	10,120 00
Receiver for White's creek near Wayneport	2,080 00		2,080 00
Stop-gate between Spencerport and Adams' basin	3,260 00		3,260 00
Stop-gate in Erie canal at Holley			
Changing towing-path and improving line of canal along high clay bluff.	1,896 88	600 00	2,496 88
Deepening Erie canal from 1st lock to Lyell st., Rochester.	9,700 00	38,000 00	47,700 00
Improving and protecting discharge from Newark waste-weir	2,900 00		2,900 00
Reducing bottom of Erie canal on sections 277, 278, 282, 283, 285 and 286			*
Removing material from prism of canal on sections 207, 208, 209 and 212			
Iron bridge near Leach's mill at Lyons.	1,360 00		1,360 00
Total	\$198,016 88	\$124,420 00	\$322,436 88

TABLE No. 3.  
GENESEE VALLEY CANAL.

CHARACTER OF WORK.	PAID BY DRAFTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
<i>Extraordinary Repairs.</i>			
*Deepening Summit level from lock No. 97 to entrance of feeder from Oil creek reservoir .....		\$1,140 00	\$1,140 00
Iron bridge at Cummingsville.....			
Iron bridge at Fillmore.....			
Iron bridge at Hinsdale.....			
Iron bridge at Canawaugus.....			
Cleaning out channel of Beard's creek below aqueduct.....	\$5,160 00	920 00	6,080 00
Stone abutment and docking at east end of Genesee river dam at Mount Morris .....			
Total .....	\$5,160 00	\$2,060 00	\$7,220 00

*STATEMENT showing the expenditures upon this division for and during the fiscal year ending September 30th, 1871.*

## ORDINARY REPAIRS.

NAME OF WORK OR EXPENDITURE MADE.	PAYMENTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
<i>General Management.</i>			
Commissioner's salary and travel .....	\$2,400 00	.....	\$2,400 00
Clerk hire, office rent and contingent expenses of Canal Commissioner's office at Rochester .....	1,967 78	.....	1,967 78
Total .....	\$4,367 78	.....	\$4,367 78
<i>Eric Canal.</i>			
Repair section No. 10 .....	\$34,000 00	.....	\$34,000 00
Repair section No. 10, salary of superintendent.....	1,000 00	.....	1,000 00
Repair section No. 11 .....	43,500 00	.....	43,500 00
Repair section No. 11, salary of superintendent.....	1,000 00	.....	1,000 00
Repairing Oxbow break .....	45,000 00	.....	45,000 00
Borrowing pits for repairing Oxbow break .....	1,700 00	.....	1,700 00
Protecting Oxbow embankment on account of break .....	8,626 58	.....	8,626 58
Repair section No. 12 .....	24,918 51	.....	24,918 51
Repair section No. 13 .....	38,106 38	.....	38,106 38
Repairing Hodginsville sluice culvert .....	1,020 00	.....	1,020 00
Repair section No. 14 .....	44,400 00	.....	44,400 00
Repair section No. 14, salary of superintendent.....	1,000 00	.....	1,000 00
On construction contracts, as per Table No. 1 .....	1,003 70	.....	1,003 70
Removing boulders from Eric basin channel, in Buffalo .....	1,275 00	.....	1,275 00
Painting signs for bridges, at Buffalo .....	15 00	.....	15 00
Remodeling and repairs of State steam dredge .....	871 14	.....	871 14
Tending swing-bridge on Exchange street, Rochester .....	770 00	.....	770 00
Miscellaneous expenditures for same swing-bridge .....	148 96	.....	148 96
Services of man in passing crowds of boats after the Oxbow break .....	12 00	.....	12 00
Engineering, inspecting and incidental expenses .....	7,544 58	.....	7,544 58
Services of division agent, including travel .....	2,220 00	.....	2,220 00
Services of patrolmen .....	3,044 00	.....	3,044 00
Services of watchmen .....	1,775 00	.....	1,775 00
Total .....	\$262,950 85	.....	\$262,950 85
<i>Genesee Valley Canal.</i>			
Repair section No. 1 .....	\$67,364 91	.....	\$67,364 91
Repair section No. 2 .....	48,932 90	.....	48,932 90
Repair section No. 3 .....	22,880 20	.....	22,880 20
Repair section No. 4 .....	8,336 76	.....	8,336 76
Engineering, inspecting and incidental expenditures .....	3,530 19	.....	3,530 19
Services of man superintending steam dredge .....	626 00	.....	626 00
Services of patrolmen .....	100 00	.....	100 00
Commutation of farm bridge on Wm. Betts' farm, town of Chili, county of Monroe .....	250 00	.....	250 00
Total .....	\$152,020 96	.....	\$152,020 96



ANNUAL REPORT OF THE  
STATEMENT — (Continued).

NAME OF WORK OR EXPENDITURE MADE.	PAYMENTS.		Total.
	Amount paid during fiscal year.	Amount previously paid.	
EXTRAORDINARY REPAIRS.			
Erie Canal.			
On construction contracts, as per table No. 1 .....	\$147,517 97	\$123,844 28	\$271,362 25
On work abandoned, as per table No. 1 .....	1,496 00		1,496 00
On construction contracts, as per table No. 2 .....	198,018 88	194,420 00	322,438 88
Engineering, inspecting and incidental expenses .....	15,615 00		15,615 00
Printing and publishing notices of lettings .....	479 13		479 13
Total .....	\$363,124 98	\$248,264 28	\$611,389 26
Genesee Valley Canal.			
On construction contracts, as per table No. 1 .....	\$63,038 27	\$250,420 00	\$313,458 27
On construction contracts, as per table No. 3 .....	5,160 00	2,060 00	7,220 00
Engineering, inspecting and incidental expenses .....	6,049 00		6,049 00
Printing and publishing notices of lettings .....	273 86		273 86
Building post and board fence around lock-house, lots Nos. 64, 65 and 66 .....	43 50		43 50
Total .....	\$74,564 63	\$252,480 00	\$327,044 63
Enlargement of Erie Canal.			
Drafts and certificates for awards made by Canal Board and Canal Appraisers .....	\$2,295 00		\$2,295 00
Fees for witnesses before Board of Canal Appraisers .....	23 06		23 06
Total .....	\$2,318 06		\$2,318 06
Construction Genesee Valley Canal.			
Drafts and certificates for awards made by Canal Board and Canal Appraisers .....	\$5,398 65		\$5,398 65
Services as clerk for Board of Canal Appraisers .....	30 00		30 00
Total .....	\$5,428 65		\$5,428 65
SUMMARY.			
General management .....	\$4,367 73		\$4,367 73
Ordinary repairs, Erie canal .....	262,950 85		262,950 85
Extraordinary repairs, Erie canal .....	363,124 98	\$248,264 28	611,389 26
Enlargement, Erie canal .....	2,318 06		2,318 06
Ordinary repairs, Genesee Valley canal .....	152,020 96		152,020 96
Extraordinary repairs, Genesee Valley canal .....	63,038 27	250,420 00	313,458 27
Construction Genesee Valley canal .....	5,428 65		5,428 65
Total .....	\$853,249 57	\$498,684 28	\$1,351,933 85

## EXTRAORDINARY REPAIRS.

Authorized by act chapter 715, Laws, 1868; act chapter 1877, Laws of 1869, act chapter 767, Laws of 1870, and act chapter 930, Laws of 1871.

The works which have been completed and the present condition of those now in progress, authorized by said acts, may be stated as follows :

## ERIE CANAL.

## WORK COMPLETED.

The improving and widening canal, and constructing vertical walls therein, between Erie and Commercial streets, in the city of Buffalo; improving and completing Main and Hamburg Street canal; dredging channel around north end of Erie basin breakwater; constructing iron bridge over slip leading to river lock at Tonawanda; removing old warehouse foundation from Black Rock harbor, and reconstructing docking along channel leading to Niagara river below ship-lock at Black Rock, have been completed. Iron bridges have been completed on Georgia street in the city of Buffalo, at Brockville and county line, and at Leach's mill in village of Lyons, and a wrought-iron swing-bridge on Main street in village of Albion. Iron needle beams have been inserted in bridges on Ferry, Genesee, Prime and Michigan streets in the city of Buffalo, and in bridges at Palmyra, Macedon and Port Gibson. Vertical walls have been completed at Pendleton; near Shelby's Basin, at Eagle Harbor; Reynales' Basin, and between third and fourth locks east of Rochester. An additional sluice culvert in town of Lockport; a stop gate between deep hollow culvert and wide water west of Rochester; ditch to drain lands of Thomas McGuire; improving channel-way and discharge culvert of Thomas creek; improving channel-way and discharge from Newark waste-weir; the waste-weir on three mile level in Brighton, and the construction and testing steam canal dredge, are also completed.

## GENESEE VALLEY CANAL.

The following described work is substantially completed, although finals are not rendered in all of the cases :

Slide bank at Portage; completing the widening, deepening and improving of the Genesee Valley canal at Rochester, and cleaning out channel of Beard's creek below aqueduct.

## ERIE CANAL.

## WORK IN PROGRESS.

The work of extending, raising and strengthening division bank at Lower Black Rock, is in progress, and will be completed during the coming winter. The work has been somewhat delayed by the operation of an injunction which was procured by one of the adjacent mill owners, who claimed that the completion of the work on the plan proposed, would interfere with his rights as a lessee of a portion of the surplus water from the canal. The question was decided in favor of the right of the State to make the construction as contemplated, and the work will be progressed to completion, as before stated.

The work under contract for dredging in Black Rock harbor, is nearly completed, and that of constructing guard piers, and protecting and securing swing-bridge at Ferry street in said harbor is progressing rapidly. The pipe sewer along Erie canal to State ditch in Tonawanda will be completed early the coming winter.

A portion of the material for iron bridges at Smith street, and over Genesee Valley canal, at its junction with the Erie, in Rochester; also for bridges between the towns of Gates and Greece, and on section 275, at Spencerport, are already delivered, and the superstructures will be erected previous to opening of canal next season. The above is also true of the work of inserting needle beams in bridges at Young's and Eagle harbor.

Materials are also delivered for vertical walls at Fairport, Bushnell's basin and Cartersville. The stop-gates to be constructed at Adams' Basin and Holley will be completed early next spring; the materials being already nearly delivered.

The work of deepening the canal from first lock east of Rochester to Lyell street, including the cutting down of bottom of Rochester aqueduct, was continued till the opening of navigation last spring, but not completed for the whole distance specified in the contract. It is believed that the appropriation for same is nearly or quite expended.

The work should be continued to completion on the plan originally proposed, which will require an additional appropriation of at least \$25,000.

Contracts have been made for reducing the bottom of the canal on sections Nos. 277, 278, 282, 283, 285 and 286, and for removing material from prism of canal on sections Nos. 207, 208, 209 and 212; but the work cannot be commenced until the water is drawn from the canal this fall.

The work of doubling the locks on this division is progressing slowly, on account of the impossibility of procuring dressed stone of proper quality with sufficient rapidity, and also of securing such a force of stone cutters as is desirable. The stone are principally procured from Waterloo, Split Rock and Janesville. Such arrangements are now consummated as is confidently expected will insure increased rapidity in the construction of the work. The guard-lock and bulkhead at Black Rock, and the three locks at Lockville, will be brought into use the coming spring. Most of the other lock pits are already partly excavated and some of the foundations put down, and a large amount of materials have been procured and delivered for the construction of the several locks.

There should be appropriated the further sum of \$126,000, the coming winter, to complete the work in accordance with the original estimate. The original estimate of the cost of the work was \$526,000. There has been appropriated under previous laws, \$400,000, leaving the sum of \$126,000 still to be provided, as above stated.

The removing bench walls and constructing slope wall and pavement between Lyons and Lockville will be completed next spring.

#### WORKS RECOMMENDED AND THE ESTIMATED COST OF SAME, AND AMOUNT OF ADDITIONAL APPROPRIATIONS REQUIRED TO COMPLETE THOSE NOW UNDER CONTRACT.

The undersigned desires to call attention to that portion of the canal through Black Rock harbor, and for that purpose will reiterate what he said in his last annual report relative thereto. (See pages 200 and 201.)

The canal, from Erie street, in the city of Buffalo, to the head of Black Rock harbor, is 150 feet wide; thence to a little below Ferry street, a distance of 5,700 feet, it is about seventy to eighty feet wide, when it enters the broad part of said harbor, which extends to the foot of the same at the dam at Lower Black Rock. The upper portion of the harbor, including the narrow canal along same, has a width of 260 feet; the lower portion is much broader. The water for supplying the canal as far east as Montezuma, 150 miles, and for supplying the several mills on the pier and at Lower Black Rock, passes through these channels, creating so strong a current through the narrow canal of the upper part of the harbor as to prove seriously detrimental to navigation.

The demands of these mills are inexorable and constant, and the

amount of water used by them under a low head and badly constructed wheels is enormous. Their right, under perpetual leases from the State, to use the surplus waters of the harbor, resolves itself practically into the right to use all they want, regardless of the interests of the State or the condition in which navigation is left in consequence.

There are two ways of remedying this difficulty: Discontinue the leases, and cut off the water from the mills altogether, which would destroy the industrial interests that have grown up under and are dependent upon such use for its sustenance, and pay the damages that would most likely be claimed consequent to such discontinuance; or, make the canal through the harbor, by the construction of a division bank or wall entirely independent of same; the canal channel to be not less than 120 feet wide in any part thereof, through which only would be passed the feed water for the canal east, while through the channel outside of the canal would be passed the water for the mills, each separate and independent of the other. The estimated cost of constructing canal as above proposed, including a lock to connect with Scajaquada creek, is \$350,000.

Act chapter 767, Laws of 1870, authorized the deepening and improving the narrow canal in said harbor, and appropriated \$80,000 for that purpose, and the work was let pursuant to said law. But the citizens of Buffalo petitioned the Canal Board not to proceed with the work until it could be carried forward on the general plan above indicated.

On the fifth of September last, upon the recommendation of the division and resident engineer, and approval of the Commissioner in charge, the Canal Board did, by resolution, adopt the general plan for constructing the canal through Black Rock harbor, so as to make the same independent of said harbor, and authorized the work now under contract, and to the extent of the present appropriation therefor, to be done with reference to such general plan of construction; and the work is now being prosecuted in accordance with such direction. To complete the whole balance of the work, extending thence to the guard-lock section or dam at lower Black Rock, the engineer's estimate will cost \$270,000; but to complete it thence to the broad part of the harbor, which is as far as the narrow canal extends, will cost as estimated, \$125,000; and the undersigned recommends that such appropriation should be made, so that the most difficult portion of navigation in that vicinity, may be thus improved in the shortest practicable time.

Act chapter 930, Laws of 1871, appropriated \$10,000 to build a

vertical wall on the north side of the Main and Hamburg Street canal, between Louisiana and Hamburg street. The engineers estimate the cost of constructing said wall at \$25,000. The construction of coffer-dams, bailing and draining, is a large item in the cost of the work, and while these items of cost are nearly as much to build a part of the wall as to do the whole, it was not deemed advisable to contract for a part, until the Legislature had had an opportunity to provide for the whole, should it desire to do so. The additional appropriation required for such purpose is \$15,000.

The same act appropriated \$20,000 to build a swing-bridge over the Erie canal at Buffalo street, and a bridge to connect Munger and Averill streets, both in the city of Rochester, to be constructed pursuant to act chapter 348, Laws of 1871. The engineers estimate the cost of these works, built as directed by said act, at \$42,000.

Proposals were advertised for, and the lowest bid for said work was \$ . Consequently, no further action has been taken in the premises.

If said bridges are to be built as contemplated by said act, a further appropriation of \$25,000 will be required; but if the swing-bridge be built at right angles to the canal, placing its center on the center line of Buffalo street, and the city of Rochester dispense with Caledonia avenue bridge, which is in close proximity, allowing the swing-bridge to accommodate both streets, then the present appropriation would suffice, provided the city should be at the expense of the land for, and the construction of the sections of streets immediately approaching, the bridge from either direction.

The same act appropriates \$10,000 for moving lock No. 44, on the Genesee Valley canal, in the village of Nunda, and directed the same to be paid out of any money appropriated, or to be appropriated, for extraordinary repairs of the canals. The work here contemplated consists of taking up, moving and rebuilding said lock about one-eighth of a mile south of its present site, cutting down and forming the canal thereto between said locations, and constructing two new road or street bridges, the cost of which, as estimated by the engineers, is \$32,000. Consequently, no action has been taken in the matter. In case the above appropriation is unavailable, and the Legislature desires the work to be done, then an appropriation equal to the amount of said estimate will be required for that purpose.

The pile and sheet-piling docking which supports the towing-path and berme bank through the village of Tonawanda, between Military road and State ditch culvert is considerably decayed, and the plan

on which it is constructed is not such a one as will answer the purpose intended for a long period, and while maintained, will require constant and expensive repairs. It was only constructed as a hurried and temporary expedient, after the break of 1865, which washed out the vertical wall with which the banks were originally supported. I am satisfied that the same should be rebuilt as soon as practicable, on change of plan, to timber cribs and vertical wall. The cribs to be carried up to low water, and from thence to top of bank supported with a vertical wall sustained by crib-work. The estimated cost of the improvement is \$80,000.

As stated in a preceding part of this report, the appropriation for deepening and improving the Erie canal from first lock east of Rochester to Lyell street, including the cutting down of the bottom of Genesee river aqueduct, is nearly, if not quite exhausted, and the work is not fully completed between those points. I consider the improvement a very desirable and important one, and respectfully recommend that an additional appropriation of \$25,000 be made for this purpose.

The three locks at Lockville in Wayne county, are located near each other, and where the short reaches or levels between them are extremely crooked, making navigation even with the single locks at times difficult and vexatious. These difficulties will be largely increased next season, when the double locks at this point are brought into use. I therefore respectfully recommend the construction of vertical walls through these short reaches or levels between the said locks, so that a sufficient channel-way may be obtained to accommodate navigation when the double locks are brought into use. The estimated cost of the improvement is \$25,000.

In connection with the preceding named work, it is equally important that the berme abutment of the road bridge located immediately at the foot of the middle lock, be set back about fifteen feet, so as to give unobstructed ingress and egress to the new lock now being constructed.

As the bridge itself is located on an important thoroughfare, it should be rebuilt of iron when the span is increased by setting back the said berme abutment. I recommend an appropriation of \$5,000 for that purpose.

For many years great difficulty has been experienced in maintaining the waste-weir near Lock Berlin, in consequence, partly, of defective original plan, and partly of its location in a quicksand swamp. The weir is now entirely useless, and I recommend its

reconstruction at a point several hundred feet east or west of the old one, where a solid and safe foundation may be secured. For this purpose an appropriation of \$3,500 will be required.

The composite culvert on the three mile level in Brighton, near Donnelly's bridge, has been the source of considerable delay to navigation, and anxiety to those in charge of the canal in past years. It carries under the canal the drainage of quite a large section of country, and has to be of considerable capacity. The surrounding land is some feet below the bottom of canal; and, as a consequence, the present culvert is so much below, that if any leakage occurs it is a source both of expense and delay to coffer-dam around it and remedy the difficulty. The culvert trunk is of timber, which will gradually decay. I think the safety of navigation demands the substitution of cast-iron pipes in place of the present timber trunk. The estimated expense of the change is \$8,000.

An appropriation of \$3,000 should also be made to substitute an iron pipe in place of a box culvert under the Genesee river feeder in Rochester. The Genesee river is adjacent to the feeder, and in times of freshets bursts up through the present culvert into the feeder, which leaves a passage for the water of the feeder and canal out into the river when the freshet recedes.

It is considered important that a culvert be constructed under the Genesee Valley canal at some convenient point, to be made available for use as a sewer to furnish effectual drainage for a part of the eighth ward of the city of Rochester. A considerable portion of the drainage is now passed into said canal. I advise the construction of an iron pipe sewer for the purpose named, at an estimated cost of \$2,200.

St. Paul street, in the city of Rochester, and the Erie canal are adjacent for several hundred feet, the berme side of the canal and the west sidewalk of the street being protected by a heavy wall of masonry some twenty feet in height, constructed by the State. A wooden protection railing has been maintained by the State on this wall, which railing is now decayed and unsafe. I recommend an appropriation of \$1,000 for rebuilding the said railing of iron.

An appropriation of \$1,000 should also be made to pay for work done and still to be done in changing line of canal, and protecting same, at high clay bluff, west of Rochester.

The common council and citizens of Rochester have made an application to have a channel cut in the river bed from the weigh-lock discharge to the north side of Court street bridge, a distance of about 700 feet. The weigh-lock and the outlet sewer from the seventh and twelfth wards of the city, discharge through the same channel. This



outlet sewer passes under the Erie canal, and for many years it has been usual to uncover same in the prism of canal to drain off the water, and it is claimed by the citizens that the sewer has become in a measure stopped up by the earth and other material thus washed into it from the canal, and that it is retained there from the fact that a proper channel is not provided where the weigh-lock and sewer discharge into the river bed. I believe the plan proposed would relieve the difficulty complained of. The estimated cost is \$3,000.

It has been the settled policy of the State to replace the timber bridges over the canals in villages and cities, and on all important thoroughfares, with iron, as fast as the old bridges have to be rebuilt.

In pursuance of this plan, an appropriation will be required for the western division during the next year of \$35,000.

I respectfully reiterate my recommendation of last year, that an appropriation of \$10,000 be made to defray the cost of supplying the upper two miles of the Dansville branch of the Genesee Valley canal with water during the dry season. This object is expected to be attained by the diversion of a portion of the waters of Loon lake, discharging same through Mill creek into the canal at Dansville. This will complete a well considered system of works for supplying the Genesee Valley canal with water; and, with this done, it is believed the supply will be ample, and the expectation of the friends of the canal in this regard fully realized.

It is desirable that an appropriation of \$3,500 be made to construct a pipe and open drain from near Monroe street bridge to the second Brighton lock to drain adjacent lands kept wet and useless by leakage from the canal. It is, also, a source of disease to the neighborhood. The pipe drain should be constructed for a distance of 2,400 feet, and the balance of 1,700 feet should be an open drain, cut partly through the rock.

#### FINAL SURVEYS AND MAPS OF COMPLETED CANALS.

The final surveys of the Erie canal on this division have been completed, and the maps of same nearly so.

It is equally important that final surveys and maps of about forty-five to fifty miles of the Genesee Valley canal should also be made, as, for that distance, there are no maps to be found in any of the departments. This is a source of great perplexity, as such information as can only be obtained from a correct survey and map is being almost constantly called for by the Canal Appraisers, the Legislature, and by adjacent owners, to determine boundaries. I sincerely hope an appropriation of \$3,000 will be made next winter for this purpose.

## SUMMARY OF APPROPRIATIONS RECOMMENDED.

Continuing the work of constructing division bank and widening and deepening, and otherwise improving, the canal in Black Rock harbor .....	\$125,000
Chibs and vertical walls in place of pile docking in Erie canal, between military road and State ditch culvert in village of Tonawanda .....	80,000
Completing the doubling the locks on the Western division, Erie canal .....	126,000
Continuing and completing the deepening of the Erie canal from first lock east of Rochester to Lyell street, etc. ....	25,000
Constructing vertical walls on both sides of Erie canal at Lockville in the short reaches between the locks. ....	25,000
Setting back berme abutment of, and constructing an iron in place of wood bridge at Lockville. ....	5,000
Reconstructing waste-weir at Lock Berlin at a new location, .....	3,500
Reconstructing culvert on three mile level in Brighton, on change of plan from wood to iron .....	8,000
Reconstruction of culvert under Genesee river feeder, on change of plan from stone box to iron .....	3,000
Constructing iron culvert under Genesee Valley canal in city of Rochester .....	2,200
Reconstructing protection railing of iron on berme protection wall along St. Paul street in city of Rochester. .	1,000
To pay for work done and to be done to complete the changing line of canal and protecting same at high clay bluff, west of Rochester .....	1,000
Improving the channel discharge from Rochester weigh-lock. ....	3,000
To supply the Dansville branch of the Genesee Valley canal with water from Loon lake. ....	10,000
For changing plans of bridge on Western division. ....	35,000
For completing final surveys and maps of Genesee Valley canal. ....	3,000
To construct a pipe and open drain in rear of tow-path in the town of Brighton. ....	3,500
To pay for constructing a waste-weir and discharge gates through the north wall of the new canal aqueduct over the Genesee river, at Rochester, and a rubble wall in cement across the old canal, at east end of said aqueduct, as authorized by resolution of Canal Board on the 18th of November, 1871 .....	4,700
For completing the removing of bench walls and constructing slope walls and pavement, between Lyons and Lockville .....	10,000
For constructing iron tow-path change-bridge in place of wooden bridge, on Hamilton street, over Erie canal, at Black Rock. ....	4,000

## TOLLS AND TONNAGE OF THE CANALS FOR 1871, BEING THE SECOND YEAR OF LOW TOLLS.

The tonnage of the canals in 1870, the first year of reduced tolls, did not meet the expectations of the friends of the low toll policy; but the business of the past year, 1871, has fully vindicated the wisdom of that measure.

The aggregate production of the grain-growing portion of the State does not equal one-fourth of the grain consumed within its borders. The balance, three-fourths, must be obtained elsewhere, and is mainly derived from the western States and Canada. It is an object to the great mass of the people of this State (for the mass are consumers), to purchase such balance of supply at the lowest rates. Three cents per bushel in cost makes a difference to the consumers of several million dollars yearly; hence, they desire cheap freights, and low tolls is an element that makes cheap freight.

The past season's navigation was about two weeks shorter than that of 1870, owing to the break at Oxbow embankment in the spring, and the early close by ice on the 29th of November last. Notwithstanding which the season's business was large, aggregating 6,467,888 tons, which is in excess of the tonnage of any previous year.

The toll receipts of 1871 were \$3,099,300.46, being in excess of the tolls of 1870 nearly half a million dollars.

The following statement shows the amount of flour and grain shipped by the canal from Buffalo, in each year, during the last five years:

YEAR.	1867.	1868.	1869.	1870.	1871.
Flour, barrels .....	15,468	5,744	51,928	76,471	47,731
Wheat, bushels.....	10,109,718	10,360,060	16,363,480	16,737,713	19,628,316
Corn, bushels.....	14,931,812	15,999,136	7,816,960	5,911,668	20,695,305
Oats, bushels.....	9,419,686	10,423,504	3,938,046	5,572,254	6,649,439
Barley, bushels.....	1,206,733	204,218	82,429	841,024	1,030,733
Rye, bushels.....	736,578	638,699	76,792	373,322	986,517
Total grain, bushels.....	36,404,526	37,625,817	28,322,707	29,435,981	48,390,310

The railway shipments of grain from Buffalo, during the past year, were 26,217,499 bushels, showing a movement of western grain through our State of over 75,000,000 bushels, and this is exclusive of that received and manufactured into flour at, and in the vicinity of, Buffalo. It also shows that about two-thirds of the grain in bulk went forward by canal, and the other third by rail.

The movement of flour by canal is small and apparently growing less, being mostly carried by rail. It is claimed that the shipments of grain from Buffalo during the year equaled seventy-three per cent of all the shipments of grain from Chicago, Milwaukee, Toledo and Duluth, in the same time. The average rate of freight on wheat by canal from Buffalo to New York for the past season, was 10.9c. against 15.8c. in 1862, 17.7c. in 1863 and 18.9c. in 1864. The average rate of freight for the season constitutes the best evidences of the reliable and general good condition of the canals, and the facility and regularity with which boats passed over them to enable so large a business to be done in so brief a period, and that our canals, when properly cared for, are equal to all the demands of the trade offered. It is also gratifying that the past season has been a reasonably prosperous one to the shipper, as well as the carrier, and the State in the increased receipts of toll over the previous year, consequent upon such increased traffic.

The Patriot and Journal, of Buffalo, in speaking of the facilities for the transportation of western freights by our canals and railroads, says: "Before another season closes these facilities will be greatly increased. The completion of the Buffalo, New York and Philadelphia railroad, and the practical introduction of steam as a motive power on the canal, both of which we firmly believe will be accomplished facts before this time next year, will nearly, if not quite double our transportation capacity.

"In view, therefore, of the very moderate freight rates which prevailed last season in the face of such immense offerings of freight, we fail to see that the necessities of trade demand a new route around the falls. At all events, after the experience of the past season, we have no fear that private capital will rashly invest in the enterprise. And we feel perfectly justified in entering a vigorous protest against the transfer of this large and lucrative trade to the St. Lawrence route, by the aid of the United States government, which is the object of those who are pushing the scheme for constructing the Niagara ship canal."

#### STEAM TOWAGE ON THE CANALS.

Several of the State officers, in their last annual report, recommended the Legislature to make an appropriation for testing and determining the best plan of steam towing on the canals. In compliance with such request, the Legislature of 1871 passed an act entitled "An act to foster and develop the internal commerce of the

State, by inviting and rewarding the practical and profitable introduction upon the canals, of steam, caloric electricity, or any motor other than animal power, for the propulsion of boats."

The Commissioners appointed by the act are to make such examinations and test as authorized thereby, during the years 1871 and 1872, and shall demand and require :

*First.* The inventions or devices to be tested and tried at their own proper cost and charges of the parties offering the same for trial.

*Second.* That the boat shall, in addition to the weight of machinery and fuel reasonably necessary for the propulsion of said boat, be enabled to transport, and shall actually transport, on the Erie canal, on a test or trial exhibition, under the rules and regulations now governing the boats navigating the canals, at least 200 tons of cargo.

*Third.* That the rate of speed made by said boat shall not be less than an average of three miles per hour, without injury to the canals or their structures.

*Fourth.* That the boat can be readily and easily stopped or backed by the use and power of its own machinery.

*Fifth.* That the simplicity, economy and durability of the invention or device must be elements of its worth and usefulness.

*Sixth.* That the invention, device or improvement can be readily adapted to the present canal boats; and, lastly, that the Commissioners shall be fully satisfied that the invention or device will lessen the cost of canal transportation and increase the capacity of the canals.

Any means of propulsion or towage other than by a direct application of power upon the boat, which does not interfere in any manner with the present method of towage on the canals, and complying in all other respects with the provisions of this act, may be entitled to the benefits thereof; but this shall not be construed to apply to the system known as the Belgian system, or to any mode of propulsion by steam engines, or otherwise, upon either bank of the canals.

In case the Commissioners shall determine, from their examination and tests under the law, that any party is entitled to the benefit thereof, they shall so certify, firstly, in the sum of \$50,000, and secondly, in a like sum, in case the said invention or device has been successfully operated upon the canals, and has been, or will be, largely adopted as a motor on said canals, by reason of its superiority over any known method of propulsion. The inventive genius of the country is now actively engaged in devising plans to win the prize, and it is anticipated that many schemes will be tried in the course of

the coming season, and it is really to be hoped that some of them may have sufficient merit to be generally adopted, so that the abusive use and cruelty of animal power now employed may be discarded. There are many difficulties to be overcome to reach a successful issue in such a channel as the Erie canal, and he who can make the most speed at the least cost, compared with the present time and cost, will deserve the thanks of the public, if he fails to obtain the reward.

The Belgian system of towing was excluded from competing under the law, perhaps for the reason that the Legislature had previously granted to Addison M. Farwell, his associates and successors, permission to organize a corporation under the general law, to introduce upon the canals of this State the "European system of steam towing by submerged chains or cables." Mr. Farwell, pursuant to such grant, organized a company for the purpose of introducing said system of towing, and made the first experiment on the canal between Albany and Troy, in the month of November last.

The Argus, in speaking of said experiment, says: The principle of the system of towing here introduced is substantially the following: An iron or steel wire rope, of from one-half inch to one inch diameter, according to circumstances, is laid down in the bottom of the canal or river from end to end, following the bends and curves of the water-course, resting uninterruptedly through or over locks, and being fastened only at the two extreme ends of the canal.

A steam engine, portable or fixed, is placed on the vessel which has to be towed, or which may serve as a tug for towing other boats. This engine works one of Fowler's clip drums, a pully of peculiar construction, which requires here a more detailed description. It consists of a cast-iron wheel, the circumference of which, forming the groove of a pully, is provided with a number of movable clips, turning round steel centers. These clips, each pair about two and a half inches long in the direction of the circumference, nearly touch each other, and form thus a complete movable groove, into which a rope may be placed. The centers of the clips are so arranged that the rope presses into the groove by its own strain, produces a slight movement of the clips toward the center of the drum, narrowing thus the space in which the rope rests. This will produce a certain pressure of the clips against the rope, which increases with the force with which the rope is pressed into the clips, and which again is in proportion to the strain exerted by the rope. It is therefore clear, that with a very small strain in what is called the back or slack rope, a very considerable strain in the pulling or front rope can be exerted without any

danger of slipping, as the friction between rope and pulley increases in proportion to the power exerted.

The necessary tension in the back rope where it is not produced by the natural disposition of the machinery (as, for instance, in lifting apparatus for mines, etc.), is gained by a press pulley rolling on the rope where it leaves the drum, produces sufficient friction between the last clips touched by the cable itself to replace the required back strain and secure the action of the clips.

The experience of many years has proved that drums of four to five feet diameter, acting on a rope which touches half the circumference of the groove, are capable of transmitting with perfect safety forty to fifty horse-power, the rope moving at the rate of four feet per second, or, in other words, exerting a direct pull of over 6,000 pounds.

Into the groove of this drum, which is attached to and worked by machinery on board the vessel, the towing cable is placed. The engine being put in motion, the boat is naturally hauled along the towing cable, which by the action of machinery is in a slanting direction lifted up from the bottom of the canal, and, after passing over the clip-drum, falls back again slack and nearly perpendicularly into the water. The weight of the rope, which produces the necessary friction and adhesion to the bottom of the canal, is, if we may say so, the fixed point at which the clip-drum pulls.

The strain produced by it will be felt some distance ahead of the boat, stretching out that part of the rope. But, after having passed the clip-drum, the wire will fall back into the bottom of the canal with the slackness it had before.

The slackness of the rope behind, combined with the fact that ahead of the boat the cable is lifted from the bottom of the canal to a considerable distance, given by the strain, by its weight per foot, and by the depth of the canal, allows an almost perfectly free movement of the boat with regard to steering.

It is clear that the power of the engine is thus applied to the propulsion of the vessel in the most direct way imaginable. There are four causes for loss of power inherent to the system; but, all combined will scarcely amount to five per cent of the power of the engine under any ordinary circumstances. Without going into detailed calculation, we have as loss:

First. The unavoidable friction of the gear, communicating the movement of the engine to the clip-drum, which usually is a single, short, intermediate shaft with bevel wheel and pinion; the first moved by the crank shafts, the second moving the clip-drum.

Second. The power required to bend the rope around the drum and guide pully. This, if the pulleys are large enough, is of very small importance.

Third. The loss produced by the standing direction in which the tide rope is lifted from the canal bottom while the direction of the useful draft is horizontal. The engine exerts its full power in the slanting direction of the rope, producing thereby a somewhat smaller horizontal strain, which actually propels the boat, and a small vertical one which depresses it. Practically, the angle of the rope in towing two 200 ton boats against a current of one and a half miles, with a speed of two and a half miles in a canal of seven feet depth, proved to be 1.13. This produced a loss of less than one per cent of the power applied. Lighter boats, greater depths of water, and heavier cables would, of course, make the circumstances less favorable.

Fourth. The vertical strain produced by the standing rope will sink the boat somewhat deeper into the water, and thus increase the power required to move it, causing a further trifling loss.

"The lifting up of the rope itself from the bottom of the canal produces no direct loss of power, as the cable falls back again to the same level, and the lifting and sinking back naturally balance each other.

"In spite of these trifling losses, therefore, we see that nearly the whole power of the engine is employed for direct propulsion. This allows the employment of engines of the smallest description, of scarcely any weight, which would diminish the capacity of the vessel, and taking no space whatever out of the hold of the boat. It gives especially, also, the possibility of using portable engines, placed on and removed from the boat whenever required.

"Commercially considered, the comparatively small first cost of the machinery, the reduction of coal consumed, the trifling working expenses generally, and especially the saving of time and cost of machinery, if a regular service of portable engines is introduced, secure to this system advantages, up to the present time, no other plan for towing canal and river boats could offer."

The undersigned was present at a subsequent experiment of said plan of towing, and, from his examinations and observation at the time, was forcibly impressed with its apparent adaptability to the towing of canal boats, by tugs, in trains. The great traffic upon our canals would require two lines of cables, one for *up* and one for *down* boats. Some difficulty will be experienced in providing for a proper slack of the cable and in adjusting it, also in passing the locks; and it will, perhaps, be necessary to throw off the cable at each lock, and use



horses for towing in and out of same, and across all the short levels, as the most expeditious and least expensive method in connection with the cable on other portions of the canals. Time and experience will, however, determine what is best in many of the details, provided the main or general system is practically correct and adapted to the purpose. The undersigned is of opinion that, if the moneyed means can be obtained to properly construct and inaugurate the system in the hands of discreet and judicious men, it may be made a success, and meet the demands of the public in the way of an increase of speed and reduction of cost, thus, in effect, increasing the capacity of our canals for business in nearly the same proportionate ratio as the time of transit is lessened.

Respectfully submitted.

JOHN D. FAY,  
*Canal Commissioner.*

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T A B L E S  
ACCOMPANYING THE ANNUAL REPORT OF THE  
CANAL COMMISSIONERS.

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*The following is a Schedule of all the Repair Contracts now remaining in force, let in pursuance of act, chap. 105, Laws of 1857, to the present time, and shows the commencement of the several terms, the canal or section embraced in the contracts, the duration of each term, the annual compensation to the contractor, and the several amounts of cash deposited as security for the performance of the contracts, and the name of the contractor or contractors. (The Repair Contracts for the other sections have been surrendered under chap. 55, Laws 1870.)*

COMMENCEMENT OF TERM.	Canal and section.	Duration of term.	Annual compensation.	Cash security.	Name of contractor.	Residence.	Remarks.
March 1, 1869.	Erie, No. 8.	4 10-12 years.	\$18,000	\$4,000	A. G. Fish	Fulton	Expires January 1, 1874.
March 1, 1868.	Erie, No. 14.	4 10-12 years.	44,400	4,000	George D. Lord	Rochester	Expires January 1, 1873.
January 1, 1868.	Chenango, No. 2.	5 years.	9,970	4,000	John Hull	Binghamton	Expires January 1, 1873.
March 1, 1869.	Oswego, No. 2.	4 10-12 years.	28,400	4,000	A. C. Belden	Geddes	Expires January 1, 1874.
March 1, 1869.	Crooked Lake, N. 1.	4 10-12 years.	7,750	4,000	O. C. Knapp	Penn Yan	Expires January 1, 1874.

## REPAIR CONTRACTS.

COMMENCEMENT OF CONTRACTS.	Canal and section.	Duration of contract.	Annual compensation.	SECURITY.		Names of contractors.	Residence of contractors.	Names of attorneys and assignees.	Residence of attorneys and assignees.	Contract expires.
				Cash.	U. S. bonds pursuant to act ch. 571, Laws 1867.					
March 1, 1869.	Erie, No. 8.	4 10-12 years.	\$18,900	\$4,000	\$5,000	A. G. Fish	Fulton			Jan. 1, 1874
March 1, 1868.	Erie, No. 14.	4 10-12 years.	44,400	4,000	6,000	George D. Lord.	Rochester			1, 1873
January 1, 1868.	Chenango, No. 2.	5 years.	9,970	4,000	6,000	John Hull.	Binghamton			1, 1873
March 1, 1869.	Oswego, No. 2.	4 y. 10 m.	28,400	4,000	6,000	A. C. Belden.	Geddes			1, 1874
March 1, 1869.	Crooked Lake.	4 10-12 years.	7,750	4,000	/ 6,000	O. C. Knapp.	Penn Yan			1, 1874

## REPAIR CONTRACTS.

COMMENCEMENT OF CONTRACT.	Canal and section.	Duration of contract.	Annual compensation.	One-twelfth of annual com- pensation.	Fifteen per cent of one-twelfth annual com- pensation re- tained.	Monthly dues.	One-twelfth amount of schedule.	Monthly dues less one- twelfth amount of schedule.
March 1, 1869.	Erie, No. 8.	4 years 10 months.	\$18,000	\$1,500 00	\$225 00	\$1,275 00	.....	.....
March 1, 1868.	Erie, No. 14.	4 years 10 months.	44,400	3,700 00	555 00	3,145 00	.....	.....
January 1, 1868.	Chenango, No. 2.	5 years.	3,970	890 83	134 62	706 21	.....	.....
March 1, 1869.	Oswego, No. 2.	4 years.	28,400	2,366 66	355 00	2,011 66	.....	.....
March 1, 1869.	Crooked Lake.	4 years 10 months.	7,750	646 83	96 87	549 96	.....	.....

*Repair Contracts—(Continued).*

COMMENCEMENT OF CONTRACT.	Canal and section.	Fifteen per cent retained due annually.	Names of con- tractors.	Residence of contractor.	Names of assignees.	Residence of assignee.	Contract surrender- ed or aban- doned.	Contract expires.
March 1, 1869.	Erie, No. 8.	\$2,700 00	Aaron G. Fish.	Fulton.	.....	.....	.....	January 1, 1874
March 1, 1868.	Erie, No. 14.	6,660 00	George D. Lord.	Rochester.	.....	.....	.....	January 1, 1873
January 1, 1868.	Chenango, No. 2.	1,485 50	John Hull.	Binghamton.	.....	.....	.....	January 1, 1873
March 1, 1869.	Oswego, No. 2.	4,260 00	A. C. Belden.	Genesee.	.....	.....	.....	January 1, 1874
March 1, 1869.	Crooked Lake.	1,162 50	Oliver C. Knapp.	Penn Yan.	.....	.....	.....	January 1, 1874

*The following is a Schedule of Repair Contracts, with the percentage allowed in pursuance of Act, chapter 252, Laws of 1864.*

Commencement of term.	Canal and section.	Duration of term.	Original annual compensation.	Percentage allowed.	Annual compensation, including percentage.	Abandoned.	Name of contractor.	Expires.
March 4, 1863.	Erie, No. 1.	3½ years.	\$39,900 00	73	\$68,688 00	August 1, 1864.	Spencer Jackson.	January 1, 1867
March 4, 1863.	do 2.	8 yrs. 303 days.	14,500 00	61	14,500 00	August 1, 1864.	Lewis Selye.	
May 1, 1862.	do 4.	4½ years.	12,780 00	65	12,780 00	August 1, 1864.	Hosch & Lowell.	
March 4, 1863.	do 5.	4½ years.	4,483 00	70	4,483 00	August 1, 1864.	Philip Corking.	
May 1, 1861.	do 7.	5 years.	3,400 00	62	5,653 80		Thomas Gale.	May 1, 1866
Nov. 1, 1862.	do 8.	4½ years.	4,940 00	60		Sept. 22, 1864.	Chas. Nichols.	
May 1, 1861.	do 9.	5 years.	7,000 00	61	11,270 00		Chas. J. Hayden.	May 1, 1866
March 4, 1863.	do 10.	3 yrs. 303 days.	11,960 00	62	19,375 20		Chester B. Thomas.	January 1, 1867
Nov. 1, 1862.	do 11.	4½ years.	11,900 00	60	19,040 00		Byron M. Hanks.	January 1, 1867
April 1, 1862.	do 12.	4½ years.	6,700 00	51	10,117 00		Edward A. Mills.	January 1, 1867
March 15, 1861.	do 13.	5 years.	9,800 00	70		August 1, 1864.	Francis Hitchens.	
March 1, 1863.	do 14.	3 10-12 years.	14,400 00	60		August 1, 1864.	Archibald McArthur.	
April 1, 1862.	Chemung, No. 1.	4½ years.	15,960 00	60	25,586 00		James Bellows.	January 1, 1867
May 1, 1861.	Chenango, No. 1.	5 years.	13,900 00	50	20,855 00		A. Peck & Co.	May 1, 1866
Oct. 1, 1860.	do 2.	5 years.	5,600 00	50		August 1, 1864.	John P. Smith.	
May 1, 1861.	do 3.	5 years.	7,000 00	53	10,710 00		Wm. Avery.	May 1, 1866
May 1, 1862.	Owego, No. 1.	4½ years.	9,000 00	35	12,150 00		Chas. E. Case.	January 1, 1867
May 1, 1862.	do 2.	4½ years.	11,900 00	50	17,850 00	March 30, 1865.	George M. Case.	
July 1, 1862.	Cayuga and Seneca, No. 1.	4½ years.	9,950 00	41	14,029 50		H. W. Randall.	January 1, 1867
Oct. 1, 1860.	Crooked Lake, No. 1.	5 years.	3,869 00	55	5,996 95		Wm. McArthur.	October 1, 1865
Feb. 1, 1862.	Genesee Valley, No. 1.	5 years.	8,472 00	60		August 1, 1864.	John Lambert.	
March 15, 1861.	do 2.	5 years.	12,540 00	60		August 15, 1864.	Wm. McArthur.	August 1, 1865
Aug. 1, 1860.	do 3.	5 years.	7,433 00	50	11,149 50		Archibald McArthur.	
Oct. 1, 1862.	Champlain, No. 1.	4½ years.	13,848 00	60		August 1, 1864.	Anson Bangs.	January 1, 1867
Aug. 1, 1860.	do 2.	5 years.	9,300 00	60	12,000 00	August 1, 1864.	H. D. Denison.	January 1, 1866
Aug. 1, 1863.	do 3.	3 5-12 years.	7,500 00	60	13,050 00		Edward H. Edwards.	March 1, 1866
May 1, 1861.	Black River, No. 1.	4½ years.	8,700 00	50	6,267 00		Benj. F. Maxon.	Nov. 1, 1864
March 1, 1861.	do 2.	5 years.	4,178 00	50			Ward & McVicker.	
Nov. 1, 1859.	do 3.	5 years.	3,800 00	50	5,700 00			

*STATEMENT showing amounts expended by superintendents of repairs and paid repair contractors, an-d average cost per mile on each and all canals, from 1827 to 1870, inclusive.*

YEARS.	ERIE AND CHAMPLAIN CANALS.			OSWEGO CANAL.			CATUGA AND SENECA CANAL.			CHEMUNG CANAL.		
	Cost of repairs.	Average per mile.		Cost of repairs.	Average per mile.		Cost of repairs.	Average per mile.		Cost of repairs.	Average per mile.	
1827.....	\$232, 473	\$298		.....	.....		.....	.....		.....	.....	
1828.....	225, 846	513		.....	.....		.....	.....		.....	.....	
1829.....	222, 951	529		.....	.....		.....	.....		.....	.....	
1830.....	202, 968	461		.....	.....		.....	.....		.....	.....	
1831.....	168, 240	353		.....	.....		.....	.....		.....	.....	
1832.....	337, 303	743		.....	.....		.....	.....		.....	.....	
1833.....	338, 585	746		.....	.....		.....	.....		.....	.....	
1834.....	429, 659	976		.....	.....		.....	.....		.....	.....	
1835.....	382, 921	866		.....	.....		.....	.....		.....	.....	
1836.....	310, 153	704		.....	.....		.....	.....		.....	.....	
1837.....	365, 406	830		.....	.....		.....	.....		.....	.....	
1838.....	374, 713	851		.....	.....		.....	.....		.....	.....	
1839.....	297, 722	676		.....	.....		.....	.....		.....	.....	
1840.....	364, 252	827		.....	.....		.....	.....		.....	.....	
1841.....	355, 697	581		.....	.....		.....	.....		.....	.....	
1842.....	322, 354	733		.....	.....		.....	.....		.....	.....	
1843.....	297, 614	676		.....	.....		.....	.....		.....	.....	
1844.....	399, 094	844		.....	.....		.....	.....		.....	.....	
1845.....	371, 155	907		.....	.....		.....	.....		.....	.....	
1846.....	350, 883	843		.....	.....		.....	.....		.....	.....	
1847.....	345, 433	804		.....	.....		.....	.....		.....	.....	
1848.....	345, 851	809		.....	.....		.....	.....		.....	.....	
1849.....	425, 277	973		.....	.....		.....	.....		.....	.....	
1850.....	437, 239	973		.....	.....		.....	.....		.....	.....	
1851.....	525, 332	1, 134		.....	.....		.....	.....		.....	.....	
1852.....	570, 777	1, 233		.....	.....		.....	.....		.....	.....	
1853.....	577, 371	1, 271		.....	.....		.....	.....		.....	.....	
1854.....	571, 608	1, 254		.....	.....		.....	.....		.....	.....	
1855.....	554, 865	1, 021		.....	.....		.....	.....		.....	.....	
1856.....	458, 742	973		.....	.....		.....	.....		.....	.....	
1857.....	435, 916	973		.....	.....		.....	.....		.....	.....	
1858.....	446, 746	990		.....	.....		.....	.....		.....	.....	
1859.....	390, 008	896		.....	.....		.....	.....		.....	.....	
1860.....	306, 652	673		.....	.....		.....	.....		.....	.....	
1861.....	320, 532	735		.....	.....		.....	.....		.....	.....	
1862.....	323, 625	744		.....	.....		.....	.....		.....	.....	
1863.....	393, 625	879		.....	.....		.....	.....		.....	.....	
1864.....	519, 505	1, 194		.....	.....		.....	.....		.....	.....	
1865.....	816, 660	1, 877		.....	.....		.....	.....		.....	.....	
1866.....	695, 168	1, 559		.....	.....		.....	.....		.....	.....	
1867.....	489, 170	1, 135		.....	.....		.....	.....		.....	.....	
1868.....	443, 677	1, 030		.....	.....		.....	.....		.....	.....	
1869.....	609, 226	1, 401		.....	.....		.....	.....		.....	.....	
1870.....	1, 084, 378	2, 483		.....	.....		.....	.....		.....	.....	
1871.....	898, 671	2, 066		.....	.....		.....	.....		.....	.....	

## Statement of superintendents' expenditure—(Continued).

YEARS.	CROOKED LAKE CANAL.		CHENANGO CANAL.		GENESEE VALLEY CANAL.		ONEIDA LAKE CANAL.	
	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.	Cost of repairs.	Average per mile.
1887.....	.....	.....	.....	.....	.....	.....	.....	.....
1888.....	.....	.....	.....	.....	.....	.....	.....	.....
1889.....	.....	.....	.....	.....	.....	.....	.....	.....
1890.....	.....	.....	.....	.....	.....	.....	.....	.....
1891.....	.....	.....	.....	.....	.....	.....	.....	.....
1892.....	.....	.....	.....	.....	.....	.....	.....	.....
1893.....	.....	.....	.....	.....	.....	.....	.....	.....
1894.....	\$3,653	\$381	.....	.....	.....	.....	.....	.....
1895.....	3,556	454	.....	.....	.....	.....	.....	.....
1896.....	4,789	592	.....	.....	.....	.....	.....	.....
1897.....	6,314	776	.....	.....	.....	.....	.....	.....
1898.....	4,454	556	.....	.....	.....	.....	.....	.....
1899.....	3,597	448	.....	.....	.....	.....	.....	.....
1890.....	4,501	568	.....	.....	.....	.....	.....	.....
1891.....	9,094	1,139	.....	.....	.....	.....	.....	.....
1892.....	8,113	1,014	.....	.....	.....	.....	.....	.....
1893.....	4,047	505	.....	.....	.....	.....	.....	.....
1894.....	3,951	493	.....	.....	.....	.....	.....	.....
1895.....	4,765	595	.....	.....	.....	.....	.....	.....
1896.....	5,809	736	.....	.....	.....	.....	.....	.....
1897.....	6,890	868	.....	.....	.....	.....	.....	.....
1898.....	8,518	1,064	.....	.....	.....	.....	.....	.....
1899.....	10,296	1,267	.....	.....	.....	.....	.....	.....
1890.....	5,630	705	.....	.....	.....	.....	.....	.....
1891.....	7,751	969	.....	.....	.....	.....	.....	.....
1892.....	4,923	616	.....	.....	.....	.....	.....	.....
1893.....	5,123	641	.....	.....	.....	.....	.....	.....
1894.....	3,647	456	.....	.....	.....	.....	.....	.....
1895.....	4,447	556	.....	.....	.....	.....	.....	.....
1896.....	9,803	1,235	.....	.....	.....	.....	.....	.....
1897.....	4,809	606	.....	.....	.....	.....	.....	.....
1898.....	6,588	823	.....	.....	.....	.....	.....	.....
1899.....	5,197	648	.....	.....	.....	.....	.....	.....
1890.....	4,586	575	.....	.....	.....	.....	.....	.....
1891.....	5,197	648	.....	.....	.....	.....	.....	.....
1892.....	5,197	648	.....	.....	.....	.....	.....	.....
1893.....	5,197	648	.....	.....	.....	.....	.....	.....
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1890.....	5,197	648	.....	.....	.....	.....	.....	.....
1891.....	5,197	648	.....	.....	.....</			





Add payments on account of canal repairs by the Canal Commissioners, exclusive of payments to contractors for repairs, viz. :

By George W. Chapman,

Erie canal..... \$86,026 20

By William W. Wright,

Erie canal..... 31,202 50

By Jno. D. Fay, Erie canal, 28,037 54

\$145,266 24

By G. W. Chapman, Champlain canal, 70,642 37

By William W. Wright, Oswego canal, 8,204 15

By William W. Wright, Cayuga and

Seneca canal ..... 7,542 77

By Wm. W. Wright, Chemung canal, 3,890 09

By William W. Wright, Crooked Lake

canal ..... 929 32

By Wm. W. Wright, Chenango canal, 66,012 16

By G. W. Chapman, Black River canal, 18,133 19

By John D. Fay, Genesee Valley canal, 4,526 67

\$325,146 96

Total amount expended for ordinary repairs from 1st

October, 1870, to 30th September, 1871..... \$1,842,729 96

Add payments on account of extraordinary repairs by

Canal Commissioners, viz. :

Eastern division..... \$400,779 72

Middle division..... 321,988 85

Western division..... 487,643 61

1,210,412 18

Add for cents.....

17

Total expended for ordinary and extraordinary repairs from 1st October, 1870, to September 30,

1871..... \$3,053,142 31

TABLE

*Exhibiting the date of the opening and the closing of the Hudson river, and the number of days open; also the time of commencement and close of each navigable season of canals, and the number of days of navigation since 1824; also the date of the opening of Lake Erie since 1827.*

OPENING AND CLOSING OF THE HUDSON RIVER.			COMMENCEMENT AND CLOSE OF NAVIGATION OF ERIE CANAL.			
River open.	River closed.	Days open.	Canal open.	Canal closed.	Navigable days.	Opening of the lake.
March 3, 1824	January 5, 1824	309	April 30, 1824	December 4	219	
March 6, 1825	December 13, 1824	283	April 30, 1825	December 5	238	April 21, 1827
February 25, 1826	December 13, 1826	302	April 30, 1826	December 18	243	April 1, 1828
March 20, 1827	November 25, 1827	291	April 29, 1827	December 18	241	April 10, 1829
February 8, 1828	December 23, 1828	220	March 27, 1828	December 20	269	May 5, 1830
April 1, 1829	January 14, 1829	286	May 9, 1829	December 17	242	May 8, 1831
March 15, 1830	December 25, 1830	283	April 16, 1830	December 1	230	May 8, 1831
March 15, 1831	December 6, 1831	263	April 16, 1831	December 1	241	April 27, 1832
March 25, 1832	December 21, 1832	269	April 25, 1832	December 12	238	April 27, 1833
March 21, 1833	December 13, 1833	277	April 17, 1834	December 12	240	April 6, 1834
March 29, 1834	December 15, 1834	291	April 17, 1834	November 30	230	May 8, 1835
March 25, 1835	November 30, 1835	261	April 25, 1835	November 26	216	April 27, 1836
April 4, 1836	December 7, 1836	261	April 20, 1837	December 9	234	May 16, 1837
March 27, 1837	December 14, 1837	297	April 12, 1838	November 25	228	March 31, 1838
March 19, 1838	November 25, 1838	296	April 12, 1838	December 16	241	April 11, 1839
March 25, 1839	November 18, 1839	286	April 20, 1839	December 9	228	April 27, 1840
February 25, 1840	November 6, 1840	285	April 20, 1840	November 28	221	April 14, 1841
March 24, 1841	November 19, 1841	286	April 24, 1841	November 30	222	March 7, 1842
February 4, 1842	November 28, 1842	308	April 20, 1842	November 30	214	May 6, 1843
April 13, 1843	December 10, 1843	242	May 1, 1843	November 30	222	March 14, 1844
March 18, 1844	December 17, 1844	278	April 18, 1844	November 26	228	April 8, 1845
February 24, 1845	December 8, 1845	283	April 15, 1845	November 25	224	April 11, 1846
March 18, 1846	December 14, 1846	275	April 16, 1846	November 25	214	April 23, 1847
March 17, 1847	December 25, 1847	263	May 1, 1847	November 30	223	April 9, 1848
March 22, 1848	December 27, 1848	282	May 1, 1848	December 5	219	March 25, 1849
March 19, 1849	December 26, 1849	286	May 1, 1849	December 5	234	March 25, 1850
March 30, 1850	December 17, 1850	283	April 22, 1850	December 11	235	April 2, 1851
February 25, 1851	December 14, 1851	293	April 16, 1851	December 5	239	April 30, 1852
March 28, 1852	December 23, 1852	270	April 20, 1852	December 10	245	April 14, 1853
March 23, 1853	December 21, 1853	294	April 20, 1853	December 3	217	April 29, 1854
March 17, 1854	December 6, 1854	266	May 1, 1854	December 10	224	April 21, 1855
March 11, 1855	December 14, 1855	246	May 8, 1855	December 10	214	May 2, 1856
April 11, 1856	December 14, 1856	246	May 8, 1856	December 15	223	April 27, 1857
February 27, 1857	December 27, 1857	308	May 6, 1857	December 15		

Table exhibiting the date of the opening and closing of the Hudson River, &amp;c.—(Continued).

OPENING AND CLOSING OF THE HUDSON RIVER.			COMMENCEMENT AND CLOSE OF NAVIGATION OF ERIE CANAL.			Opening of the lake.
River open.	River closed.	Days open.	Canal open.	Canal closed.	Navigable days.	
March 20, 1858.....	December 17, 1858.....	273	April 28, 1858.....	December 8.....	225	April 15, 1858
March 13, 1859.....	December 10, 1859.....	273	April 15, 1859.....	December 12.....	242	April 7, 1859
March 6, 1860.....	December 14, 1860.....	293	April 25, 1860.....	December 10.....	232	April 17, 1860
March 5, 1861.....	December 23, 1861.....	294	May 1, 1861.....	December 10.....	224	April 13, 1861
April 4, 1862.....	December 19, 1862.....	259	May 1, 1862.....	December 10.....	224	April 15, 1862
April 3, 1863.....	December 11, 1863.....	253	May 1, 1863.....	December 9.....	223	April 3, 1863
April 11, 1864.....	December 12, 1864.....	277	April 30, 1864.....	December 8.....	223	April 13, 1864
March 22, 1865.....	December 16, 1865.....	270	May 1, 1865.....	December 12.....	226	April 26, 1865
March 20, 1866.....	December 15, 1866.....	270	May 1, 1866.....	December 12.....	226	April 28, 1866
March 26, 1867.....	December 8, 1867.....	257	May 6, 1867.....	December 20.....	229	April 21, 1867
March 24, 1868.....	December 5, 1868.....	232	May 4, 1868.....	December 7.....	217	April 19, 1868
April 5, 1869.....	December 6, 1869.....	248	May 6, 1869.....	December 10.....	218	May 1, 1869
March 31, 1870.....	December 17, 1870.....	261	May 10, 1870.....	December 8.....	213	April 16, 1870
March 12, 1871.....	November 20, 1871.....	263	April 24, 1871.....	December 1.....	230	April 1, 1871

The Genesee Valley canal was opened on the 13th day of May, 1867. All the canals except the Erie were closed on the 19th day of December, 1867. In consequence of the same being done by the freshet of the spring of 1869 to the Eastern Division of the canals, the time for opening the canals for navigation on said division was extended to May 10, 1869.

On the 17th day of December, 1870, the board passed the following resolution:  
 Resolved, That on a time for closing the Erie canal on the Middle and Eastern Divisions be extended to the 10th inst., and on the Champlain canal until the 15th inst., unless the same shall sooner be closed by law.

Champlain Canal was opened April 17, 1871.

*SCHEDULE of contracts let by Board of Canal Commissioners under Acts, chap. 327, Laws of 1854, and chap. 554, Laws of 1855, showing the commencement of the several terms, the canal or section embraced in the contract, the duration of each term, and the annual compensation to the contractors:*

Commencement of term.	Canal Section.	Duration of term.	Annual compensation.	Remarks.
October 1, 1854.....	Section 3, Erie canal.....	Five years.	\$7,370	Expired October 1, 1859.
March 1, 1855.....	Section 1, Erie canal.....	do	43,000	Expired March 4, 1860.
October 1, 1855.....	Section 1, Chenango canal.....	do	14,700	Expired October 1, 1860.
October 1, 1855.....	Section 2, Chenango canal.....	do	6,000	Expired October 1, 1860.
October 1, 1855.....	Oneida Lake canal.....	do	3,975	Expired October 1, 1860.
January 1, 1856.....	Crooked Lake canal.....	do	4,473	Expired October 1, 1860.
January 1, 1856.....	Section 1, Black River canal.....	do	3,999	Expired January 1, 1861.
January 1, 1856.....	Section 2, Black River canal.....	do	9,985	Expired January 1, 1861.
April 15, 1858.....	Addition to section 2, Black river canal, chap. 185, Laws of 1858.....	.....	2,000	Expired January 1, 1861.
February 1, 1856.....	Section 2, Genesee Valley canal.....	Five years.	13,900	Expired February 1, 1861.



40	346	5,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080	1,106	1,080
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40	.....	1	40	.....	3	130	1	40	.....	.....	.....	.....	.....
35	.....	6	180	.....	.....	.....	1	85	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
15	.....	1	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
10	.....	1	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	457	33,765	215	16,370	103	13,360	213	13,470	271	23,925			







*Statement—(Continued).*

[illegible]

















*STATEMENT of the number, class and tonnage of boats built and registered in 1870.*

TONNAGE.	M. bow.	D. bow.	Scows.	Decked scows.	Lake.	Bull heads.	Line.	Total boats.	Total tonnage.
300.....	...	...	...	...	...	...	...	...	.....
280.....	...	...	...	...	...	...	...	...	.....
250.....	...	...	1	...	5	1	...	7	1,750
240.....	...	...	15	1	29	4	...	49	11,760
230.....	...	1	23	...	12	1	...	37	8,510
225.....	...	...	...	...	9	1	...	10	2,250
220.....	...	...	2	...	8	1	...	11	2,420
200.....	...	...	2	...	10	1	...	13	2,600
190.....	...	...	...	...	...	...	...	...	.....
180.....	...	...	1	...	1	...	...	2	360
170.....	...	...	...	...	...	...	...	...	.....
160.....	...	...	1	...	...	...	...	1	160
150.....	...	...	...	...	...	...	...	...	.....
140.....	...	...	1	...	1	...	...	2	280
130.....	...	...	12	...	7	...	...	19	2,470
125.....	...	...	...	1	1	...	...	2	250
120.....	...	1	4	...	2	...	...	7	840
115.....	...	...	1	...	1	...	...	2	230
110.....	...	...	...	1	1	...	...	2	220
100.....	13	1	4	...	5	7	...	30	3,000
95.....	...	...	1	...	...	3	...	4	380
90.....	1	1	4	2	4	1	...	13	1,170
85.....	1	...	3	...	1	...	...	5	425
80.....	...	...	1	...	1	3	...	5	400
75.....	4	...	...	...	...	...	...	4	300
70.....	7	2	...	...	...	...	...	9	630
60.....	21	9	...	...	...	1	...	31	1,860
50.....	1	...	1	...	...	...	...	2	100
45.....	...	...	...	...	...	...	...	...	.....
30.....	...	...	...	...	...	...	...	...	.....
25.....	...	...	...	...	...	...	...	...	.....
20.....	...	...	1	...	...	...	...	1	20
15.....	...	...	1	...	...	...	...	1	15
	48	15	79	5	98	24	...	269	42,400

## RATES OF TOLL, 1871.

ESTABLISHED BY THE CANAL BOARD ON PERSONS AND PROPERTY TRANSPORTED ON THE NEW YORK STATE CANALS, TO TAKE EFFECT ON THE OPENING OF NAVIGATION.

*Toll is to be computed upon the Weight ("1,000 pounds per mile") of all articles contained in the following list, unless otherwise stated, opposite to the articles excepted.*

A.		cts.	m.	fr.
Acid, sulphuric .....		0	2	0
Agricultural implements, going from tide-water .....		0	1	5
Articles not enumerated, going toward tide-water .....		0	2	0
On the same, going from tide-water .....		0	1	5
Agricultural productions of the United States, not particularly specified ...		0	2	0
Apples .....		0	2	0
Ashes, pot and pearl .....		0	2	0
Ashes, leached .....		0	0	5

B.		cts.	m.	fr.
Bacon .....		0	1	0
Barley .....		0	1	5
Barrels, empty, transported in boats .....		0	1	0
Barrels, empty, transported in rafts .....		0	5	0
Bars of iron .....		0	1	5
Barytes .....		0	1	5
Beans .....		0	1	5
Bedstead stuff (see <i>Lumber No. 3</i> ) .....		0	2	0
Beef, salted .....		0	1	5
Bleaching powders, going from tide-water .....		0	1	0
Bloom iron, going from tide-water .....		0	0	5
Boat knees (see <i>Lumber No. 3</i> ) .....		0	2	0
Boats, used chiefly for transportation of passenger upon all canals, per mile, 4		0	0	0
On the same, if they elect to commute for tolls upon passengers....		3	0	0
Boats, used chiefly for transportation of property, per mile.....		2	0	0
On the same, if they elect to commute for tolls upon passengers....		2	3	0
Boats registered before July 1st, 1862, whose bows do not conform to regulation No. 40, per mile .....		3	0	0
Bolts, stave, if carried in boats .....		0	1	0
Bolts, stave, if carried in rafts .....		0	5	0
Bones .....		0	0	5
Boxes, stuff for (see <i>Lumber No. 3</i> ) .....		0	2	0
Bran .....		0	1	0
Brick .....		0	1	0
Brimstone .....		0	1	0
Broom handles (see <i>Lumber No. 3</i> ) .....		0	2	0
Brush backs (see <i>Lumber No. 3</i> ) .....		0	2	0
Brush handles see <i>Lumber No. 3</i> ) .....		0	2	0
Buffalo skins .....		0	2	5
Butter .....				
Butts, stave, if carried in boats .....		0	1	5
Butts, stave, if carried in rafts .....		0	5	0

C.		cts.	m.	fr.
Cabinet ware .....		0	1	5
Carboys .....		0	2	0
Carts .....		0	2	0

	cts.	m.	fr.
Car axles.....	0	1	0
Car wheels (iron).....	0	0	5
Carriages and sleighs.....	0	2	0
Casks, empty, transported in boats.....	0	1	0
Casks, empty, transported in rafts.....	0	5	0
Castings, all iron casting.....	0	1	5
Cattle, alive.....	0	2	0
Cedar posts (see <i>Lumber No. 2</i> ), per 1,000 feet per mile.....	0	5	5
Cedar, red (see <i>Lumber No. 2</i> ), per 1,000 feet per mile.....	0	5	5
Cement, fire-proof.....	0	1	0
Chair stuff (see <i>Lumber No. 3</i> ).....	0	2	0
Charcoal.....	0	0	5
Cheese.....	0	1	5
Older.....	0	1	5
Clay.....	0	1	0
Clover seed.....	0	2	0
Coal, anthracite.....	0	0	5
Coal, bituminous.....	0	0	5
Coal oil.....	0	0	5
Coal tar and products thereof.....	0	0	5
Coffee.....	0	1	0
Copper ore.....	0	1	0
Copper, pig and smelted.....	0	1	0
Corn.....	0	1	5
Corn meal.....	0	1	5
Cotton.....	0	1	0
Crockery.....	0	1	0

## D.

Deer skins.....	0	2	5
Domestic distilled spirits.....	0	1	5
Domestic cottons.....	0	1	5
Domestic woolens.....	0	1	5

## E.

Earth.....	0	0	5
Esculent roots.....	0	1	0

## F.

Fellics (see <i>Lumber No. 2</i> ).....	0	2	0
Fire-proof cement.....	0	1	0
Fire brick.....	0	1	0
Fish, salted, going from tide-water.....	0	1	0
Flax seed.....	0	2	0
Flour.....	0	1	5
Furniture, cabinet ware and chairs.....	0	1	5
Furniture for stoves, not cast-iron.....	0	1	5
Furs, and skins of animals producing furs.....	0	2	5

## G.

Gas-pipes.....	0	1	0
Glass ware.....	0	1	5
Grass seed.....	0	2	0
Grease.....	0	1	5
Gunstocks (see <i>Lumber No. 3</i> ).....	0	2	0
Gypsum, ground and unground.....	0	1	0

## H.

Hand-spikes (see <i>Lumber No. 3</i> ).....	0	2	0
Hay, pressed.....	0	0	5
Heading, undressed, transported in boats.....	0	1	0
Heading, dressed or partly dressed.....	0	1	0
Heading, transported in rafts.....	0	5	0

	cts.	m.	fr.
Hemp, going toward tide-water .....	0	1	0
Hides .....	0	1	5
Hogs, alive .....	0	2	0
Hops .....	0	2	0
Hop poles (see <i>Lumber No. 3</i> ) .....	0	2	0
Hop poles, transported in rafts .....	0	5	0
Hoop poles (see <i>Lumber No. 3</i> ) .....	0	2	0
Hoop poles, transported in rafts .....	0	5	0
Hoops, rived .....	0	2	0
Horses .....	0	3	0
Horses, used exclusively for towing boats and other floats, exempt from toll.			
Horse shoes .....	0	0	5
Hobs (see <i>Lumber No. 3</i> ) .....	0	2	0

## I.

Ice .....	0	0	5
Iron, in sheets, bars and bundles .....	0	1	5
Iron ore .....	0	0	5
Iron, bloom and pig, going toward tide-water .....	0	1	0
Iron, bloom and pig, going from tide-water .....	0	0	5
Iron, boiler .....	0	1	5
Iron, bridge and railing .....	0	1	5
Iron bolts .....	0	1	5
Iron safes .....	0	1	5

## J.

Junk .....	0	1	5
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## L.

Lard .....	0	1	0
Lard oil .....	0	1	0
Last blocks (see <i>Lumber No. 3</i> ) .....	0	2	0
Lath (see <i>Lumber No. 1</i> ) .....	0	2	0
Lath (see <i>Lumber No. 2</i> ) per 1,000 feet, per mile, surface measure .....	0	5	5
Lath (see <i>Lumber No. 3</i> ) .....	0	2	0
Lead, bar and pig, going toward tide-water .....	0	0	5
Leather .....	0	1	5
Lime, manufactured .....	0	1	0
Lime, water .....	0	1	0
Limestone .....	0	0	5
Looking-glass backs (see <i>Lumber No. 3</i> ) .....	0	2	0

## LUMBER, No. 1.\*

*Transported by boats, by weight, per 1,000 pounds per mile.*

White pine, white wood, cherry, bass wood, cedar boards, plank, scantling, and on all sidings, lath and other sawed stuff less than one inch thick (except such as are enumerated in <i>Lumber No. 3</i> ) .....	0	2	0
Oak, hickory, beech, sycamore, black Walnut, butternut, maple, ash, elm, fir, tamarack and yew .....	0	1	5
Hemlock and spruce .....	0	1	0

## LUMBER 2.\*

*Transported in boats by measurement, per 1,000 feet per mile.*

Boards, planks, scantling, railroad ties and sawed timber, reduced to inch measure, and all siding, lath and other sawed stuff, less than one inch thick (except such as is enumerated in <i>Lumber No. 3</i> ), tolls computed on surface measure; and all kinds of red cedar, cedar posts, estimated that a cord, after deducting for openings, will contain 1,000 feet .....	0	5	5
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\*LUMBER shall not be cleared by measurement when carried in a boat having other articles on board paying toll by weight, but such lumber shall, in all such cases, be also cleared by weight.

When a cargo is composed entirely of lumber, which can be cleared by weight or measure, the whole of such cargo shall be cleared by measurement or by weight, as the shipper or master may elect, and in no case shall a portion of any such cargo be cleared by measurement and the other portion by weight.

	cts.	m.	fr.
Hemlock, per 1,000 feet, per mile, when not weighed .....	0	3	0
Lumber No. 2, transported in rafts, per 1,000 feet, per mile .....	2	5	0

## LUMBER No. 3.\*

*Transported in boats by weight, per 1,000 pounds, per mile:*

Sawed lath of less than ten feet in length, split lath, hoop poles, hand spikes, rowing oars, broom handles, spokes, hubs, treenails, fellies, boat and ship knees, plane stocks, pickets for fences, railroad ties, last blocks; stuff, manufactured or partly manufactured, for boxes; chairs and bedsteads, hop poles, brush handles, brush backs, looking-glass backs, gun stocks, plow beams and plow handles .....	0	2	0
Sawed stuff for window blinds, not exceeding one-fourth of an inch in thickness .....	0	5	0

## M.

Mahogany .....	0	1	5
Manure .....	0	0	5
Marl .....	0	0	5
Merchandise, non-enumerated .....	0	1	5
Molasses .....	0	1	0
Moose skins .....	0	2	5

## N.

Nails .....	0	0	5
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## O.

Oats .....	0	1	5
Oil cake .....	0	1	5
Oil meal .....	0	1	5
Onions .....	0	1	0

## P.

Passengers, over ten years of age, per mile .....	0	0	5
Petroleum or earth oil, crude and refined .....	0	0	5
Peas .....	0	1	5
Peat .....	0	0	5
Pickets for fences (see <i>Lumber No. 3</i> ) .....	0	2	0
Pig copper .....	0	1	0
Pig iron, going from tide-water .....	0	0	5
Pig iron, going toward tide-water .....	0	1	0
Plane stocks (see <i>Lumber No. 3</i> ) .....	0	2	0
Plaster, calcined, or plaster of paris, going from tide-water .....	0	1	0
Plow beams (see <i>Lumber No. 3</i> ) .....	0	2	0
Plow handles (see <i>Lumber No. 3</i> ) .....	0	2	0
Pork, salted .....	0	1	5
Posts, split and round, not exceeding eight feet in length, carried in boats, per M, per mile .....	2	0	0
Potatoes .....	0	2	0
Powder and gunpowder .....	0	4	0

## R.

Rags .....	0	1	5
Railroad chairs .....	0	1	0
Railroad iron .....	0	1	0
Railroad ties (see <i>Lumber Nos. 2 and 3</i> ) .....			

\* LUMBER shall not be cleared by measurement when carried in a boat having other articles on board paying toll by weight, but such lumber shall, in all such cases, be also cleared by weight.

When a cargo is composed entirely of lumber, which can be cleared by weight or measure, the whole of such cargo shall be cleared by measurement or by weight, as the shipper or master may elect, and in no case shall a portion of any such cargo be cleared by measurement and the other portion by weight.

	cts. m. fr.		
Rails for fences, not exceeding fourteen feet in length, carried in boats,			
per M, per mile .....	2	0	0
On the same, if carried in rafts, per M, per mile .....	8	0	0
Rice, going from tide-water .....	0	1	0
Roots, esculent .....	0	1	0
Rowing oars (see <i>Lumber No. 3</i> ) .....	0	2	0
Rye .....	0	1	5

## S.

Sal soda, going from tide-water .....	0	1	0
Salted fish, going from tide-water .....	0	1	0
Salt, foreign .....	0	2	5
Salt, manufactured in this State .....	0	1	0
Sand .....	0	0	5
Sawed stuff (see <i>Lumber Nos. 2 and 3</i> ) .....			
Sawdust .....	0	0	5
Scrap iron .....	0	0	5
Sheep, live .....	0	2	0
Shingles, in boats, per 1,000 pounds, per mile .....	0	1	5
Shingles, in boats, per M, per mile .....	0	0	5
Shingles, per M, per mile, in rafts .....	0	4	0
Ship knees .....	0	2	0
Ship knees, transported in rafts .....	0	5	0
Ship stuffs .....	0	1	5
Shooks, stave .....	0	1	0
Shrubbery and trees .....	0	4	0
Siding (see <i>Lumber No. 1</i> ) .....	0	2	0
Siding (see <i>Lumber No. 2</i> ), per 1,000 feet, surface measure .....	0	5	5
Skins of animals producing furs .....	0	2	5
Slate .....	0	0	5
Sleighs .....	0	2	0
Soda ash .....	0	1	0
Spikes .....	0	0	5
Split posts and round, not exceeding eight feet in length, carried in boats,			
per M, per mile .....	2	0	0
On the same, if carried in rafts, per M, per mile .....	8	0	0
Spokes (see <i>Lumber No. 3</i> ) .....	0	2	0
Staves and heading, sawed, cut and dressed or partly dressed, shoofs and			
stave bolts and butts, not exceeding four feet and a half in length, trans-			
ported in boats .....	0	1	0
On the same if transported in rafts .....	0	5	0
Steel .....	0	1	5
Stone for the manufacture of lime .....	0	0	5
Stone, wrought .....	0	1	0
Stone, unwrought and partly wrought .....	0	0	5
Stoves .....	0	1	5
Straw, pressed, and any pressed vegetable substance used for the manufac-			
ture of paper or paper pulp .....	0	0	5
Sugar .....	0	1	0

## T.

Tallow .....	0	1	5
Tan bark, per cord, per mile, carried in boats .....	0	5	0
Tan bark, per cord, per mile, carried in rafts .....	2	0	0
Tan bark, ground, per 1,000 pounds, per mile .....	0	2	5
Tar .....	0	1	5
TIMBER, per 100 cubic feet, per mile, transported in boats :			
Squared and round, other than hemlock .....	0	6	0
Squared and round, hemlock .....	0	4	0
Squared and round (all kinds), transported in rafts .....	1	0	0
Sawed timber (see <i>Lumber No. 2</i> ), per 1,000 feet, per mile .....	0	5	5
Tin plate, going from tide-water .....	0	0	5
Tobacco, manufactured, going toward tide-water .....	0	1	0
Tobacco, going from tide-water .....	0	1	5
Treenails (see <i>Lumber No. 3</i> ) .....	0	2	0



	cts.	m.	fr.
Trees and shrubbery .....	0	4	0
Turnips .....	0	1	0
Turpentine .....	0	1	5

## V.

Varnish .....	0	1	5
Vinegar .....	0	1	5

## W.

Wagon.....	0	2	0
Water lime, going from tide-water .....	0	1	0
Water lime, going toward tide-water .....	0	1	0
Water pipes .....	0	1	0
Wheat .....	0	1	5
Window blinds, sawed stuff for (see <i>Lumber No. 3</i> ) .....	0	5	0
Window sashes .....	0	5	0
Wood for fuel, per cord, per mile.....	0	5	0
Wood for fuel, per cord, per mile, carried in rafts .....	2	0	0
Wood used in the manufacture of salt, per cord, per mile.....	0	5	0
Wool .....	0	1	0

STATE OF NEW YORK :

CANAL DEPARTMENT, ALBANY, *May 3, 1870.* }

I certify the foregoing to be a correct list of the rates of toll this day established by the Canal Board, to take effect on the opening of navigation.

JAMES A. BELL, *Auditor.*

## REGULATIONS RELATIVE TO LUMBER.

The collectors of canal tolls at Rochester, Syracuse and Utica, where a boat having on board sawed lumber or cord wood which has been cleared, either by count, measurement or *weight*, is unloaded at either of said offices, and the collectors of canal tolls at Waterford, West Troy and Albany, in every instance where a boat having on board sawed lumber or cord wood shall pass into the Hudson river, or where the cargo is unloaded at either of said offices, which has not been measured or counted by either of them, shall require the master or owner to produce the certificate of a city inspector or measurer before a new clearance is granted to said boat, stating the count or measurement of the quantity of each kind of lumber in feet, and the number of cords of wood of which said cargo was composed; and every such inspector or measurer may give his certificate upon his own personal inspection of the count or measurement; or he may give his certificate upon the written statement of the owner or consignee of said wood or lumber, which statement shall, in all cases, be accompanied with an affidavit of the measurement or count from a person of good character, and a competent measurer of lumber or wood, in the following form, viz.:

I, —, of —, do swear that I have measured the entire cargo of the boat —, of —, of which — is master, and that the following is a true statement or bill of the number of pieces, and the quantity in board measure where pieces were not less than one inch thick, and the number of pieces and the quantity in surface measure where the pieces were less than one inch thick, of each kind of lumber comprising said cargo, viz.:

[Here give the quantity of *each kind* of lumber in feet.]

And I do further swear, that where the — were not of uniform length or width, I measured each piece, and have given the true contents of the whole, having made no deduction for defective lumber.

Sworn before me, this  
day of , 18 . }

And the collector may also require the master of the boat to add his oath to the certificate of the lumber inspector, as follows:

I, A. B., master of the boat —, of —, do swear, that no part of the lumber embraced in the bill of lading and clearance was taken from said boat, from the time said clearance and bill of lading were given to me, until the same was unloaded at —, on the — day —, 18 .

[If lumber has been previously unloaded from the same cargo, state the *kind*, quantity and place of unloading.]

Sworn before me this  
day of —, 18 . }

And the certificate of the said city inspector shall certify on what evidence his certificate is given, and such certificate and evidence shall be carefully preserved in the collector's office; and in every instance where, in the opinion of the collector, this certificate cannot be furnished, or where he shall have any doubts that such certificate includes the whole amount of said cargo, he shall administer an oath to the master or owner of the boat, in relation to the correctness of his clearance.

The bill of lading of each boat loaded with lumber, and *destined to New York*, must be verified in the following manner, to entitle such boat to a clearance, viz :

1. Where the master does not superintend the loading of the boat, the shipper, or some person who has such superintendence, must swear to the correctness of the bill of lading, as follows:

I, — of the town of —, do swear that I superintended the loading of the boat — of —, of which — is master, at —, and that the above is a true bill of lading of said boat, and gives the number of feet in board measure, where the boards are not less than one inch thick, and the number of feet in surface measure, where the boards are less than one inch thick; and that no articles of freight of any kind, other than those specified in said bill, were put on board of said boat up to the time that — took charge of the boat as master.

Sworn before me this  
day of —, 18 . }

The master of the boat will be required to make the following oath:

I, A. B., master of the boat —, of —, do swear, that no addition has been made to the cargo of said boat since the bill of lading and affidavit annexed were delivered to me, and according to the best of my knowledge and belief, the said bill represents truly all the freight on board of said boat.

Sworn before me this  
day of —, 18 . }

2. Where the master superintends the loading of the boat, the bill of lading may be signed by the shipper, and be verified by the oath of the master, as follows:

I, —, master of the boat —, of —, do swear that I superintended the loading of the boat —, of —, at —, and that the above is a true bill of lading of said boat, and gives the number of feet in board measure, where the boards are not less than one inch thick, and the number of feet in surface measure, where the boards are less than one inch thick, and that no articles of freight of any kind are on board of said boat, other than those specified in the bill of lading now presented to obtain a clearance.

Sworn before me, this  
day of —, 18 . }

Each boat destined to New York shall be furnished with a duplicate of its bill of lading, which must be left with the collector at the place where it enters the Hudson river.

In the measurement of timber to be floated on the canal, bark adhering to the wood and refuse stuff are to be estimated as forming part of the timber, and to be rated accordingly; and the inspectors are instructed to make their measurements according to these directions.

Whenever cord wood or sawed lumber shall be delivered to more than one owner or consignee, from the same cargo, the master of such boat shall deliver to a canal boat inspector a statement from each owner or consignee of the quantity in feet of each kind of lumber, and the number of cords of wood received by him from such cargo, and such statement shall be accompanied by an affidavit such as is first above prescribed, omitting the words "entire cargo," and substituting therefor "all of that portion of said cargo delivered to (here insert the owner or consignee's name)," and every master who shall violate the provisions of this regulation, shall forfeit the sum of ten dollars.

Whenever a cargo of cord wood or sawed lumber, or any portion thereof, is unloaded at a place where there is no collector, the master of said boat shall attend to the measurement of said lumber or wood when it is delivered, and it shall be the duty of said master to deliver to the nearest collector, or the collector next in order on his passage, a statement showing the kind or kinds and quantity of all the lumber in feet, and the number of all the cords of wood so unloaded, which statement shall be sworn to before the collector to whom it is delivered; and every master who shall violate the provision of this regulation shall forfeit the sum of ten dollars.


#### INFORMATION NECESSARY FOR THOSE WHO NAVIGATE THE CANALS.


##### BILL OF LADING.


Every master of a boat conveying property on a canal shall exhibit to the several collectors, hereafter mentioned, a just and true account or bill of lading of such property, signed by himself and by the consignor thereof, containing:

1. The name of each place on the canal where any portion of such property was shipped, and of the place for which it is intended to be cleared.
2. A statement of the names, description and weight of all the articles of such property, on which toll is charged by the ton, of the number of articles on which toll is charged by the number, and of the feet of each article on which toll is charged by the foot.
3. A specification of the weight or quantity of each article, where a different rate of toll is charged on different articles, on which toll is so computed.
4. No clearance of a boat and cargo shall be granted or issued by any collector of canal tolls, except upon the production to him of a bill of lading containing the above particulars.

If, on the passage, other articles are taken on board, the master must enter the number or weight of such articles on the bill.

 Property taken on within one mile of a collector's office, must pay toll at and be cleared from that office.

 Every master should know the contents of his cargo, so that he can, if required, verify his bill of lading by his oath.

 Masters who transport lumber by the pound or foot, or wood by the cord, if they take the estimate of the owner, should require him to give a bill signed by himself, and for the accuracy of which he is willing to be responsible; otherwise the master or his boat, being responsible for the treble toll to the State, may be without

remedy against the person who makes the erroneous shipping bill. [For the penalties for false bills, see 1 R. S., 1st ed., sections 123, 124 and 125.]

#### CLEARANCE.

Every boat must have a clearance, and no boat can proceed beyond the place cleared to, or unlade any article before or after its arrival there until the clearance is delivered to the collector. If there be no collector there, the clearance is to be left with the last collector. For neglecting to deliver the clearance the fine is ten dollars. The master can have a certified copy for sixpence, if not over 200 words, counting each figure as a word; if over 200 words, for one shilling, and no more in any case. Copies of clearances to get toll refunded, where a collector makes a mistake, are to be furnished without charge; property transferred from one boat to another must in all cases be recleared. A boat or float whose clearance is lost, or is claimed to be lost, must be detained until it reclear and pay the toll for the whole voyage, or produce a duplicate clearance from the office where its first clearance is claimed to have been issued. If the master or owner elects to reclear, no toll will be refunded in consequence of having paid the toll a second time, unless the original clearance is produced.

#### RAFTS.

Every raft navigating at night must carry a conspicuous light on the forward end of the same, and every raft moored or tied up is, at all times during the night, to have a conspicuous light at each end of each tow, near the outer corners thereof. Penalty for each offense, ten dollars.

#### WEIGH LOCK.

*Light Weight.*—A new boat must get its light weight within thirty days after its first clearance, or be subject to a penalty of five dollars at each weigh lock. After a new boat gets its light weight, it may continue to run, not to exceed four years, without getting another light weight, and without incurring a penalty for the omission to do so, unless it be ordered again to weigh light; or, where the weight of a boat has been *lessened* since a light weight was obtained.

#### RELATIVE TO REFUNDING.

*More by Lock.*—If a master be dissatisfied with an addition by one weigh lock, he should go into another; if the second lock differs from the first, and he is still dissatisfied, he may, if he chooses, go into a third, if there be one. If he passes the *third without weighing*, nothing will be refunded on account of the addition by the *first*. If he weighs in the third, the average of the locks will determine whether he shall have toll refunded or pay more.

*Loss by Lock.*—Although a weigh lock may show a cargo to weigh less than the bill of lading, before toll will be refunded on the difference the master must prove what *particular article*, and *how much of it*, is entered wrong on his bill, and that every other article is entered right. The cargo must be weighed in at least two weigh locks.

Toll will not be refunded on an addition made by a weigh lock in consequence of using the light weight of a previous year, except in case of addition made to a cargo under the first clearance for the season, and then only when such first clearance shall have been taken at a place where there is *no weigh lock*.

## ADDITION TO BOAT.

Before toll will be refunded in consequence of an increase in the weight of a boat, by an addition made to it after a light weight has been obtained, *a new light weight* must be taken. Affidavits in relation to any increase to the weight of a boat, without such new light weight, will not be received. Toll will only be refunded on the first cargo after such increase in the weight of a boat was made.

## BOAT AND CARGO STOPPED SHORT OF POINT CLEARED TO.

*Any collector* will refund in a case where a boat for any reason cannot proceed, on the delivery of the original clearance, and the affidavit of the master that he paid the toll on the boat and cargo, and that he is the owner of the boat, or runs the same on his own account, or that he is authorized by the person or persons who did pay it (which authority shall be in writing, signed by such person or persons, and deposited with the collector), to receive and receipt for the same.

## MIXED CARGO.

Any addition by weigh lock to a mixed cargo will be upon articles subject to the *highest rate of toll*, and going the *farthest distance*, unless the master furnishes the collector *proof* of the specific article which caused the addition.

## NEW BOATS.

The owner of every NEW BOAT must file with a collector a "certificate of registry," containing the name or names of the owners, their place of abode, the name of the boat, and its hailing place; also stating the tonnage of the boat, and whether it be a steamer, packet, line, lake, bull-head, open scow, or decked scow. If the owners reside out of the State, it is to be signed by the master. If the master of a boat owned out of the State be changed, the new master must file another certificate. No boat registered since the first day of July, 1862, whose bow does not conform to the 40th regulation of the Canal Board, will be allowed, under any circumstances, to navigate the canals of the State.

## NAME OF BOAT.

The name of the boat, with the hailing place, as it is registered, must be PAINTED in letters at least four inches in height, on some CONSPICUOUS and PERMANENT part of the OUTSIDE of the boat. No boat will hereafter be permitted to change its name or its hailing place; and for painting a new name or hailing place, which is considered part of the name, or for reporting a boat by a name different from the registered name, to any collector, the penalty is ten dollars.

When a person sells a boat, unless he requires the purchaser to file a certificate of "change of ownership" with a collector, he is still deemed in law the owner, and is liable for tolls and fines.

## INJURING OR OBSTRUCTING THE CANALS—PENALTIES THEREFOR.

For using a setting pole pointed with iron or other metal; for obstructing the canal by mooring a float, sinking a vessel, timber, stone, etc.; and for omitting to have a knife on the stem of the boat, there is, in the first case, a penalty of five dollars, and in the other two, of ten dollars each.

## DEDUCTION FOR WATER.

No greater deduction shall be made from the weight of any boat and cargo, on account of *water in the boat*, by any weigh-master weighing a loaded boat, than the amount of the water *credited and registered* to said boat when *last weighed light*.

## BOATS AT NEW YORK AND BUFFALO.

Masters of boats going to New York must, on their return, produce to the collector where the boat enters the canal from the Hudson river, full and satisfactory evidence of the correctness of the clearance and bill of lading of the down cargo, and that the full tolls have been paid thereon. If this be not done, the return clearance must be refused in all cases; and such boats as do not clear at Buffalo must bring back the certificate of the canal collector in Buffalo as to the correctness of the up cargo, or the collector at Tonawanda will not clear them.

## HEIGHT OF BOATS ALLOWED ON THE ERIE, OSWEGO, AND CAYUGA AND SENECA CANALS.

No boat or other craft whose height or distance from the water line of such boat or craft to the top thereof shall exceed eleven feet and three inches; and no loaded boat or other craft whose cargo, or any part thereof, is so arranged or placed on such boat or craft, so that the top or extreme height of the same shall exceed eleven feet and three inches from the water line of such laden boat or craft; and no steamboat, tug, or other craft propelled by steam, whose height when the top of the deck, machinery, fixtures, or other apparatus, shall exceed eleven feet and three inches, shall be allowed or permitted to navigate either of the above named canals.

## HEIGHT OF BOATS ALLOWED ON THE CHEMUNG CANAL.

No boat or other craft whose height or distance from the water line of such boat or craft, to the top thereof, shall exceed nine feet; and no loaded boat or other craft whose cargo, or any part thereof, is so arranged or placed on such boat or craft, so that the top, or extreme height of the same shall exceed nine feet from the water line of such laden boat or craft, and no steamboat, tug or craft propelled by steam, whose height when the top of the deck, machinery, fixtures, or other apparatus, shall exceed nine feet, shall be allowed or permitted to navigate the Chemung canal.

## OVERDRAFT OF WATER.

*No boat drawing more water than the limit prescribed by the Canal Board shall be cleared by any collector; and it shall be the duty of every collector, superintendent, inspector and weigh-master, to cause every boat found violating the regulations on this subject to be so far unloaded as to bring her within the prescribed limits, and in every case where a boat is so unloaded, the fact shall be entered on her clearance, with a statement of the portion of her cargo taken off; and if such boat shall be found to exceed the said draft, her master or owner shall be subject to a penalty of twenty-five dollars, to be imposed and collected by any and every collector, superintendent, inspector and weigh-master, who shall at different times and places detect such overdraft.*

## COMMISSIONERS OF THE CANAL FUND.

[The Commissioners of the Canal Fund have the superintendence of the Canal Fund, and of the Canal Debt.]

Allen C. Beach, Lieutenant-Governor; G. H. Scribner, Secretary of State; Nelson K. Hopkins, Comptroller; Thomas Raines, Treasurer; Francis C. Barlow, Attorney-General.

#### CANAL COMMISSIONERS.

[The Cana. Commissioners have the general charge of the public works, of the construction of new canals, and of the repairs of the completed canals.]

Alexander Barkley, in charge of Eastern Division, viz.: The Erie canal, from Albany, including Albany basin, to east bank of the Oneida Lake canal; Champlain canal; Glen's Falls feeder and the Black River canal and feeder, and improvement of Black river and reservoirs—315 miles.

W. W. Wright, Geneva, in charge of Middle Division, viz.: The Erie canal, from the east bank of the Oneida Lake canal to the east line of the county of Wayne, including the several feeders; Oswego canal; Cayuga and Seneca canal; Cayuga inlet; Chenango canal; Seneca river towing-path; Oneida river improvement; Chemung canal and feeder; Crooked Lake canal; Oneida Creek feeder; Oneida Lake canal; Baldwinsville canal—329 miles.

John D. Fay, Rochester, in charge of Western Division, viz.: The Erie canal, from the east line of the county of Wayne to Buffalo, including the basins at Buffalo, and the Genesee Valley canal—280 miles.

#### STATE ENGINEER AND SURVEYOR.

William B. Taylor, prescribes duties of and assigns divisions of canals to engineers; visits and inspects canals; prepares surveys, maps, plans, estimates, etc., in the construction or improvement of a canal, etc., etc.

#### THE CANAL BOARD.

The Canal Board consists of the Commissioners of the Canal Fund, the State Engineer and Surveyor and the Canal Commissioners.

Meets at the Canal Department during the sitting of the Legislature; fixes the rates of toll; appoints the engineers, superintendents of repairs, collectors of tolls, weighmasters, their assistants, and inspectors and measurers of lumber and timber, and of boats and their cargoes; and directs extraordinary repairs; hears appeals from the Canal Appraisers; remits penalties, and regulates the police of the canals, etc.

#### CANAL DEPARTMENT.

Rooms in the State Hall, in which the business of the Commissioners of the Canal Fund and the Canal Board, and the business of the Auditor of the Canal Department, is required by law to be transacted.

G. E. Dayton, Auditor. [Invested with the powers and duties formerly belonging to the Comptroller in relation to the canals; draws warrants on the Treasurer for all canal payments; audits all canal accounts; instructs canal collecting and disbursing officers; keeps account of canal receipts and expenditures, etc.; *ex officio* secretary of the Commissioners of the Canal Fund and of the Canal Board.]

#### CANAL APPRAISERS.

[They appraise the damage to individuals growing out of the construction of the canals. Office, State Hall, Albany.] Samuel North, George C. Greene, Jesse Gay.

## SUPERINTENDENTS—APPOINTED JANUARY, 1872.

NAMES	Residence.	In charge of.
Norris North.....	Cohoes.....	Section No. 1, Erie canal.
Hiram Parker.....	Rexford Flats.....	Section No. 2, Erie canal.
Samuel Donaldson.....	Fultonville.....	Section No. 3, Erie canal.
William M. Dorr.....	Little Falls.....	Section No. 4, Erie canal.
Henry S. Stark.....	Higginsville.....	Section No. 5, Erie canal.
Andrew J. French.....	Oneida.....	Section No. 7, Erie canal.
Clark Snook.....	Fayetteville.....	Section No. 8, Erie canal.
S. Gutcheas.....	Port Byron.....	Section No. 9, Erie canal.
A. P. Warren.....	Lyons.....	Section No. 10, Erie canal.
Charles W. Palmer.....	Sweden.....	Section No. 11, Erie canal.
Waldo Joslyn.....	Albion.....	Section No. 12, Erie canal.
W. W. Butrick.....	Lockport.....	Section No. 13, Erie canal.
D. Clinton Welch.....	Buffalo.....	Section No. 14, Erie canal.
F. K. Marshall.....	Schuylerville.....	Section No. 1, Champlain canal.
S. Coffin.....	Glens Falls.....	Section No. 2, Champlain canal.
E. W. Harrigan.....	Fort Ann.....	Section No. 3, Champlain canal.
H. V. Spencer.....	Fulton.....	Section No. 1, Oswego canal.
John S. Dey.....	Geneva.....	Cayuga and Seneca.
Daniel F. Pickering.....	Elmira.....	Chemung canal and feeder and Crooked Lake canal.
William L. Wilkins.....	Baldwinsville.....	Section No. 2, Oswego canal.
T. W. W. Washburn.....	Bouckville.....	Section No. 1, Chenango canal.
Jedediah E. Wheeler.....	Norwich.....	Section No. 2, Chenango canal.
James H. Armstrong.....	Binghamton.....	Section No. 3, Chenango canal.
R. A. Kneeland.....	Geneseo.....	Section No. 1, Genesee Valley canal.
John Dunn.....	Portageville.....	Section No. 2, Genesee Valley canal.
W. H. Withy.....	Cuba.....	Section No. 3, Genesee Valley canal.
Charles Parks.....	Boonville.....	Section No. 1, Black River canal.
C. Ray.....	Martinsburgh.....	Section No. 2, Black River canal.
J. H. Root.....	Carthage.....	Section No. 3, Black River canal.

## COLLECTORS.

New York.....	Abraham J. Van Allen.
Albany.....	Cornelius Hill.
West Troy.....	Charles Getman.
Schenectady.....	Charles H. Toll.
Fultonville.....	Lorenzo V. Peek.
Little Falls.....	John Reilly.
Utica.....	Edward Gebhardt.
Rome.....	William O. Shelly.
Syracuse.....	Andrew J. Smith.
Montezuma.....	William Thorn.
Palmyra.....	John W. Corning.
Rochester.....	R. H. Warfield.
Brockport.....	Henry S. Woods.
Albion.....	A. W. Crandall.
Medina.....	Stanley E. Filkins.
Lockport.....	W. S. Pound.
Tonawanda.....	Christian Schwinger.
Buffalo.....	Robert Mills.
Waterford.....	John G. Burnap.
Fort Edward.....	Charles E. Bennett.
Whitehall.....	Samuel L. Dwight.
Salina.....	Calvin A. Gilbert.
Phoenix.....	Frank David.
Oswego.....	Alvin Osborne.
Geneva.....	Theodore Atkins.
Watkins.....	A. S. Nye.
Horseheads.....	Dewitt C. Curtiss.



Corning .....	Freeman S. Pritchard.
Penn Yan .....	E. D. Tuthill.
Hamilton.....	W. F. Bonney.
Oxford .....	E. A. Bundy.
Binghamton .....	Elias Conklin.
Mount Morris.....	J. E. Lee.
Dansville.....	M. J. Bunnell.
Caneadea.....	Wm. E. Hammond.
Olean .....	Lambert S. Whitney.
Boonville .....	Harvey P. Willard.
Lyons Falls .....	Emory Allen.

## WEIGHMASTERS.

Albany.....	Edward Walker.
West Troy .....	Lewis Taylor.
Utica .....	John Batchelor.
Syracuse .....	Alex. Von Landberg.
Rochester .....	R. D. Howell.
Waterford.....	Edward Stewart.
Oswego .....	Charles North.

## ASSISTANT WEIGHMASTERS.

Albany.....	Wm. Brainard.
Albany.....	Ephraim Easton.
West Troy .....	Stephen J. Lewis.
West Troy .....	Samuel Carthy.
Utica .....	Wm. Cowley.
Utica .....	Lawrence Sullivan.
Syracuse .....	Amos Hough.
Syracuse .....	Jacob Schmeer.
Rochester .....	W. L. Wallace.
Rochester .....	Thomas Champley.
Waterford .....	Thomas Bootman.
Waterford .....	Thomas McCarnicky.
Oswego .....	C. H. Lamb.
Oswego .....	A. C. Clark.

## INSPECTORS AND MEASURERS OF LUMBER AND TIMBER AND OF BOATS AND THEIR CARGOES.

New York .....	Philip Schwartz.
New York .....	Chas. H. Swords.
Albany.....	Robert Hilson.
Albany.....	Thomas Hill.
West Troy .....	John Lorman.
West Troy .....	James R. Collins.
Utica .....	Timothy Kieley.
Syracuse .....	George Dakin.
Rochester .....	Samuel Eaton.
Buffalo .....	Jonathan T. Flint.
Buffalo .....	Bernhardt Heinrich.
Oswego .....	A. H. Burch.
Oswego .....	H. A. Richards.
Whitehall .....	S. B. Wilson.

## CIRCULAR TO SUPERINTENDENTS OF CANAL REPAIRS.

CANAL DEPARTMENT, ALBANY, *April*, 1870.*To the Superintendents of Canal Repairs on the New York State Canals :*

It has been usual hitherto to issue circular letters from this department explanatory of your duties, in order that you may thereby, to a certain extent at least, be informed of what will be expected of you by this department. In preparing the following instructions, I have, to a great extent, adopted those of my predecessors, varying them where it appeared necessary to conform to changes in the laws and duties of your office.

Section 1, chapter 57, of the Laws of 1851, expressly provides that "Superintendents appointed by the Canal Board on the several canals of this State shall give their *personal* and *constant* attention to the duties of their office."

It is not competent for you, therefore, to perform your duties by proxy, or to be engaged in any other business that requires your personal attention. It is an office that requires vigilance and activity. The interests committed to your care are great, and a little negligence on your part may be the cause of great damage. You will do great injustice, therefore, to the State, and yourself also, if you assume to enter upon the duties without a firm determination to give the State your prompt, energetic and undivided attention to the duties of your office.

It is made your duty as such superintendent, under the direction of the Canal Commissioners, and particularly of the Commissioner who has charge of the line of the canal on which you are employed, to keep in good repair the canal and the public works committed to your charge; and you are, under the advice and direction of the Commissioner, to make all necessary contracts in the manner hereinafter stated for that purpose, and faithfully to expend all such moneys as shall be placed in your hands by the Canal Commissioners and the Auditor. Sections 99, 100, 101, 102 and 103, on page 236, vol. 1, of the first edition of the Revised Statutes, contain an enumeration of some of the most important of your duties, and I therefore copy them at large :

"§ 99. Each superintendent of repairs, and every collector of tolls, before he shall enter on his official duties, shall execute and file in the office of the Auditor a bond, for the faithful execution of his trust, in such penalty and form as the Canal Board shall direct, and with such sureties as the Auditor shall approve.

"§ 100. It shall be the duty of each superintendent, under the direction of the Canal Commissioners, to keep in repair such sections of the canals, and works connected therewith, as shall be committed to his charge; to make all necessary contracts for that purpose, and faithfully to expend all such moneys as shall be placed in his hands by the Canal Commissioners or the Commissioners of the Canal Fund.

"§ 101. Each superintendent shall be under the direction of the Canal Commissioners, and especially of the acting commissioner having charge of the line of the canal on which such superintendent is employed.

"§ 102. Each superintendent shall, as often as once in sixty days, render his account to the Auditor, who shall audit the same; and if any superintendent shall omit to render his account, or his account as rendered be not satisfactory, the Auditor shall notify the Canal Board and the Commissioners of the Canal Fund thereof, and no further advances of money shall be made to such superintendent, but he shall be immediately removed from office.

"§ 103. Before any superintendent's account for expenditures shall be presented to the Auditor, the Canal Commissioner having charge of that part of the canal on

which such superintendent is employed, shall certify, on such account, that he has examined the same ; that the several disbursements, specified therein, were made under his direction on the canal, or for repairs necessary to be made thereon ; and that he believes such disbursements to be proper and reasonable, and to have been made as charged."

You are under the necessity, from time to time, of purchasing materials and employing hands for the repair of the canal ; and as it is, and always has been, the policy of the State to pay as soon as the materials are furnished or the service rendered, provision has been made to place money at the disposal of the superintendent for this purpose. The seventh and eighth sections of "An act in relation to the canals," passed May 16, 1837, provides as follows :

"§ 7. Before any advance of money shall be made to a superintendent of canal repairs, by the Auditor, he shall make out a detailed statement, in such form as the Auditor shall prescribe, of the several anticipated objects of expenditure on the line of canal under his charge.

"§ 8. If the said estimate shall be filed in the office of the Auditor, with the certificate thereon of the Canal Commissioner, stating that in his opinion the whole amount, or if less than the whole amount, what portion of the said estimate should be advanced, the Auditor may make advances on the same, in such sums and as often as he may deem necessary ; provided such advances shall not exceed the amount certified by the Commissioner."

This money is to be advanced to you on satisfactory evidence that it is required for the repair of the public works. And in order that the Auditor may have a reasonable foundation for an opinion that the advance asked for by the superintendent is "required in the execution of his duties," it is necessary that you should, previous to asking for such advance, carefully examine every part of your line of the canal, and make out a full and detailed statement of all the repairs required to be made, and the sums which, in your judgment, it will be necessary to expend upon them for the ensuing sixty days. In this estimate the location and character of the work, on which the expenditure is to be made, should be given with such minuteness and precision as to enable the Commissioner to trace every dollar of the public money to some portion of the public work.

1. If a bridge is to be repaired or rebuilt, the estimate should give the expense of removing the old and preparing for the new foundation, the quantity and cost of the stone and lime, the expense of the mason work, the quantity and cost of the timber, the planks, the board, the iron work, etc. If an aqueduct, a culvert, a lock or any other structure, requires to be repaired or rebuilt, its location should be given, and a minute estimate made of the kind, quantity and cost of the different materials necessary to be used. If there are materials on hand suitable for the contemplated work, the quantity and amount paid for the materials on hand should be stated, and deducted from the estimated cost of the structure.

2. The same particulars should be given in relation to each repair which has been commenced and remains unfinished.

3. The tools, implements and apparatus to be purchased, and their probable cost.

4. The sum necessary to pay lock tenders, according to the contracts with them for their wages, expense of lamps, etc.

5. The sum necessary to be paid, during the sixty days, to each contractor on your line.

6. If the tow-path is to be raised, or any work is to be performed which is not contracted for, the location and character of the work should be given, with a filed estimate of the expense of doing it.

The estimated expenditure upon each bridge, culvert, etc., should be shown separately, and the total sum required for the sixty days should be given in a general footing. The regulations prescribed for the estimate under the act of 1847, are as follows:

"That every superintendent of repairs on the canal, in order to obtain an advance of moneys to be expended on the canal, shall make out a detailed statement of the several objects of expenditure for the next sixty days, so far as he can anticipate the same, stating whether for building bridges, repairing aqueducts, graveling the tow-path, the pay of lock-tenders, teams and laborers, the purchase of materials, tools and the like, and may add to the estimate a separate sum for contingencies, and shall deliver two copies of the said estimate to the Canal Commissioner. On one of the said copies the Commissioner shall certify what amount in his opinion ought to be advanced, which estimate and certificate shall be filed in the Canal Department, on receiving the balance; the other copy of the estimate shall be retained by the Commissioner, to be used on the settlement of the accounts of the superintendent, at the end of sixty days."

You are required to open an account as superintendent, and separate and distinct from your individual concerns, with some bank, in which the advances made to you by the Auditor of the Canal Department are to be deposited.

You will be furnished by the bank where you keep your account with a check and bank book, the latter of which you are required to have written up at least once a month. The check book you will of course confine to your account as superintendent; and by entering in it, upon the blank margin, opposite to the check, the sums advanced to you from time to time, you will be able at any moment to tell the amount you have in bank.

The payments which you are to make upon your line of canal may be classed under five general heads, viz.:

1st. Payments to lock-tenders, which are in each case for a price certain for a month, or for two months, and the total amount of which for those periods can almost always be known with precision.

2d. Payments to regular and permanent hands under foremen who keep check rolls, and the amount necessary to pay whom for a month can, by information from the foreman a few days before the close of each month, be told with almost as much accuracy as that of the lock-tenders.

3d. Payments for materials for repairs, including payments on contract.

4th. Payments for tools, etc., being mostly merchants' and smiths' bills.

5th. Miscellaneous payments.

By a compliance with the requirements of this circular, you will always have it in your power to have to your credit, in the bank where you shall keep your account, funds sufficient for the necessary expenditures on your line of canal. And while provision is thus made for your public expenses, which will prevent the necessity of your ever having recourse to your individual credit to meet them, you will consider the funds so placed at your disposal as sacred to the uses of the canal, and that they are to be drawn from the bank no faster and in no larger sums than the necessity of payments absolutely requires. Thus, in relation to the payments of the 1st and 2d class, it is not conceived to be necessary that the moneys to make them monthly, which is as often as they will be made, need be drawn by you from the bank until near the expiration of the month in which the service shall be performed.

Payments of the third class, and their amount, cannot be anticipated with equal precision, but they can sufficiently so to render it unnecessary that you should have any considerable sum in your hands at once to meet them.

Payments of the fourth class are generally delayed by the superintendent until the close of the sixty days. Those with whom you deal to any extent, and with whom you have a running account, if they are certain of receiving their pay at the end of sixty days, would willingly delay presenting their bills until that time. Thus, payments of this class will not, generally speaking, have to be made until the close of the two months.

For payments of the fifth class, as they cannot be foreseen, and for such of those under the other heads as are of the same character, you will, of course, have to be provided with funds in your hands to the necessary amount.

The canal moneys being on interest in the deposit banks, it is expected that a superintendent will not make his drafts any oftener, nor in larger amounts, than a just regard to the public wants shall render necessary.

It is supposed, as a general rule, that not more than one-fourth part of a certified advance will be wanted by a superintendent before the middle of the first month, one-fourth part at the close of the month, one-fourth part by the middle of the second month, and the residue at the close of that month. By this manner of drawing for the advance, a superintendent never need be subjected to any delay in making his payments, if his estimate be duly filed in this department, as his deposit bank will always be willing to take his drafts on the Auditor.

The proportions of the advance, and the periods when to be drawn for, may be varied by circumstances; and should it be necessary to draw for a much larger proportion of the advance, at any one time, than as above specified, *a letter containing the reasons therefor* should be written in time to be received here previous to the presentation of the draft for payment.

By a resolution of the Canal Board, no superintendent of repairs is allowed to keep his official account at a bank which shall advance to him moneys beyond the amount for which the bank shall have advice from the Auditor that the superintendent's drafts on the Auditor will be paid.

To enable superintendents to comply with all the requirements of this circular, the Canal Board have authorized the Commissioner to allow superintendents in charge of sections not in the hands of repair contractors, such an amount of clerk hire as in his opinion shall be necessary.

This will enable you to keep the necessary accounts, and to make the prescribed estimates, reports and contracts, and the necessary copies thereof.

By keeping a separate account with every contract, with every lock-tender, and with every separate job of work, such as a bridge, a lock, a culvert, an aqueduct, in which each structure shall be charged with the quantity and cost of the stone, lime, timber, etc., excavation, embankment, mason work, carpenter work, iron, etc., etc., and also by keeping the check book or cash account, the bank book, etc., as required in the preceding part of this circular, you will be enabled at any time during the second month, by a careful examination of all these accounts, and of all the work which is going on under your supervision, to form an accurate estimate of the sum required to close up your accounts at the end of the sixty days. This examination should be made several days before the close of the second month, and in time, if it becomes necessary, to write to and get an answer from the Auditor, previous to the close of two months.

If you ascertain that you have money enough to pay all claims against you as the agent of the State, up to the time at which you are required to render your accounts, it will not be necessary for you to pursue the course hereinafter prescribed; but if, on examination, you find that the money to pay off the claims at the end of the sixty days will fall short, you should make an additional estimate and satisfy the

Commissioner of the situation of your accounts and money, and obtain from him the usual certificate for a further advance, to enable you to close up your accounts. When you ask this certificate of the Commissioner, you should exhibit to him your bank account and your expenditures, and such estimate as will enable the Commissioner to judge of the necessity of the advance.

You are not to pay out the public money without taking a receipt, dated at the time of payment; you are not, under any pretense whatever, to take a receipt without paying the money to the full amount of the receipt taken. You are not in any case to give notes or due bills to any person who has furnished materials or rendered service to the State.

A mode of transacting business, which will only be practiced by those who wish to speculate on the public money, instead of paying it to those who have earned it, must eventually result either in a fraud upon the treasury, or upon the individual who signs the receipt. To prevent either of these results, each superintendent is required to make oath that the money has actually been paid for every receipt which he asks to have credited to his account.

In the Laws of 1851, chapter 57, section 2, it is enacted that "No superintendent appointed as aforesaid, shall, under any pretense whatever, take a receipt for labor done, services performed or materials furnished for the canals, when the money shall not be actually paid."

And in the first section of chapter 810 of the Laws of 1842, it is expressly required that "proof in some apt form shall be furnished on oath that it (the voucher) was so filled up at the time it was taken, and that the money, mentioned therein to have been paid, was in fact paid in cash, or by draft on some specified bank."

Every voucher taken by a disbursing officer should contain a brief and true history of the transaction between the agent of the State and the individual who signs the voucher; if it is for labor, the account should give the number of days and the date of commencing and ending; the price per day or month; and if the voucher covers the services of any person who does not sign the receipt, the account should give such explanation as to show that the person signing the receipt had a legal right to receive and receipt for the money. For instance, if a man is employed with his son, who is a minor, or with an apprentice, the fact should be stated, and the sum for the pay of the minor or apprentice carried out in a separate line, with the price per day or month. But, in all other cases, the money should be paid to and receipted by the person who does the labor; and in no case should one man be allowed to hire hands to labor for the State, and receive the pay for such labor. All laborers should be employed by the superintendent, and the money paid to the person thus employed, or to his written order, and not to any other person.

If a disbursing officer adheres strictly to the rule of embodying in each receipt the simple truth in relation to the transaction between the State and the person signing it, he cannot be embarrassed in the settlement of his accounts. Justifiable deviations from prescribed forms may be explained or excused; but deviations from fact in a voucher destroys its validity, and an explanation, by disclosing the real facts of the case, instead of excusing the officer, tends to cast suspicion either upon his integrity or his capacity. The practice of allowing a person hired by the month to receipt for a team driven by him, but which belongs to another person, is wrong, although the interests of the State may not be affected, for the simple reason that the voucher does not give a true relation of the transaction. Such a voucher, however, may be rendered valid by a writing from the owner of the team, authorizing the driver to receipt for the use of it.

To every voucher of merchants, mechanics and miscellaneous accounts, in which are included articles purchased or services rendered, not paid for on delivery of articles or at time of rendition of service (and which is intended especially to include running accounts of every description), all accounts for labor not included in check rolls, all bills left unpaid by your predecessor, which you may be authorized or directed to pay, must be verified, before payment, before yourself or some officer authorized to administer oaths, which affidavit must be attached to the voucher and returned therewith to this department. The following form of affidavit has been prepared for such purpose. As it is desirable that at the expiration of each sixty days the department should be furnished with the full amount of expenditures during such period, there will be required in cases of all vouchers, including any item or charge accruing at a date anterior to the last abstract of expenditure, to be added to the affidavit a statement or explanation of the reasons why the same was not previously presented or paid :

STATE OF NEW YORK, }  
COUNTY OF , } ss.:

A. B. (or if a firm, say A. B., one of the firm of C. D. & Co., named in the annexed account), of , in the county of , being duly sworn, saith that all the items in the annexed account are correct, and accrued at the dates respectively as stated therein ; that no part of the same, or any item therein, is charged at more than its fair value ; that it is a just claim against the State of New York to the amount of dollars and cents, specified therein ; that no part thereof hath been included in any former bill rendered against the State ; that there are no legal or equitable offsets against the same ; that the same, or any part thereof, hath not been paid to this deponent or any other person, by or in behalf of said State, to the knowledge, information or belief of this deponent ; that this deponent is (or if a firm, say that the said firm are) the lawful owner of such account, and entitled to the payment thereof. And further, that all the labor charged therein has been applied upon the works and to the benefit of the State ; and that all the property charged therein has been delivered to the duly authorized agents of the State, and, according to the best of the knowledge, information and belief of this deponent, used for the benefit of the State, by or under the direction of one of the authorized agents thereof.

#### FOREMEN AND ROLLS.

Industrious and faithful men ought to be employed as foremen, on whose fidelity reliance can be placed to keep the roll with such accuracy as to do justice to the individual as well as to the State. The roll should be made up at the end of every month, and the number of days for which each person has labored should be carried out opposite his name, with the price per day or month, and the total sum due him ; and the roll, thus made out, should be read in the hearing of each laborer, or at least the foreman should state to each laborer the number of days, the price and the total sum entered on the roll opposite his name. When the roll is thus made out, and the sums footed up, the truth of it is to be verified by the oath of the foreman, in the following form :

STATE OF NEW YORK, }  
COUNTY OF , } ss.

of , a foreman under , superintendent, being duly sworn, saith that the foregoing check roll, the total number of day's labor entered on which is , was kept by him as foreman of the laborers and teams

entered thereon; and that he has himself (and has good reason to believe that the several other persons and the teams entered upon said roll have) performed the labor in the service of the State for the whole number of days and parts of days stated in said roll, and at the prices entered opposite each name and team respectively; and that the description of each work, and the number of days on each work, as entered on said check roll, is in all respects just and true, according to the best of his knowledge and belief.

A. B., *Foreman.*

Subscribed and sworn to, this }  
day of                    187, , before me, }

C. D., *Superintendent of Canal Repairs.*

If the labor has not in all cases been performed under the inspection of the foreman, so as to enable him to swear positively that it has been done, he can make such exceptions as the case requires.

It is desirable that the oath be administered in all cases by the superintendent. If the superintendent is not present, the roll may be sworn to before any judge, justice or commissioner.

The roll being thus verified, you should yourself pay to each individual the sum due him according to the roll, and take his receipt therefor, which should be dated on the day of the transaction.

The receipts should be numbered, commencing with the first name on the roll for No. 1, and numbering them in the order in which the names stand on the roll. These receipts, without being folded, should be arranged according to their numbers, and carefully folded in the check roll, which should be filed on the outside of the roll, with the name of the foreman, the month embraced in the roll, and the total amount paid on it.

This roll, covering the receipts of all the laborers under one foreman for a month, will occupy only one line, or the space of a single voucher, on the abstract of the superintendent, and will be numbered on the outside, with reference to the other vouchers entered upon the general abstract. The entries upon the check roll should be confined exclusively to the labor of the hands employed by the State, and the service of teams where they are furnished. The foreman and hands employed by the month are not allowed to furnish materials, and therefore the roll will be confined to their labor; and, if the same individual who is temporarily employed with his team, has also an account for materials furnished, the receipt for materials should be entered separately on the abstract of the superintendent.

Your accounts being prepared as above directed, and having made yourself sure that you have made all the payments and procured all the vouchers for the two months, you are to enter at the bottom of the abstract the one-sixth part of your salary, which you are to retain at the closing of each account. In this shape you are to lay the accounts before the Canal Commissioner upon your line, and his signature to the certificate, required from him, must be obtained before the accounts can be allowed, or even examined at this office. This should be done as soon after the close of each two months as is possible; and that you may be prepared to lay the accounts before the Commissioner, without delay to him, you should have the vouchers taken, and in order, and the abstract completed immediately after the expiration of the last month.

When all the vouchers and the amount of your salary for two months have been entered upon the abstract, and the general statement of your account is made, according to the form on the abstract annexed, the whole is to be verified by your oath, in the following form:



STATE OF NEW YORK, }  
COUNTY OF , 18 . } ss :

, superintendent of canal repairs, having charge of the line of canal specified in the above abstract, doth solemnly swear that the foregoing is a true abstract of all the vouchers taken by him as such superintendent for the days ending on the day of , 187 ; and doth further swear that the money specified in the several receipts, of which the above is an abstract (except vouchers marked A, paid by agent), has been actually paid, as specified in said receipts, in cash or by check on the bank ; and, further, that all the receipts, not specifically excepted, were each and every of them filled up as they now appear before they were signed ; and he doth further swear that, according to the best of his knowledge and belief, all the labor has been performed, services rendered and materials furnished for the benefit of the State, and the State alone, and at as fair and reasonable prices as the same could be procured ; and further swears, that all fines, penalties and forfeitures collected, and the sales of public property made during the period aforesaid on the line of canal under his charge, are, according to the best of his knowledge and belief, correctly entered on the said abstract.

Subscribed and sworn to before me this }  
day of 18 . }  
., Commissioner.

[In the absence of the Commissioner, the oath may be taken before any judge, justice or commissioner.]

If from sickness, or any other cause, you are unable to go through your line and make the payments yourself, as you ought to do when you are able, you must then make such exceptions in the oath as the case requires, making a note on the back of each receipt, stating by whom the money was paid, and furnish an affidavit, to supply the deficiency, from the agent whom you shall have employed to go through the line for you and make the payments. Those who keep the rolls should not be furnished with money to pay the hands on their rolls. There have been abuses under this practice which make it necessary to discontinue it, except in special cases ; and then an explanation of the circumstances should be given to justify a deviation from the rule.

#### REPORT AT THE END OF SIXTY DAYS.

At the close of the sixty days, in addition to the rolls of your foreman, and the receipts and abstract, you should prepare a full report, in the same order in which the estimate was made, showing the expenditure upon each structure, repair or job, and the separate cost of the labor and the different kinds of materials used, and the cost of all the materials furnished and work done on the line for the sixty days. If the cost of any culvert, bridge or other expenditure differs materially from the original estimate, the cause of such difference should be explained. Such report of expenditure should include all your expenditures during such sixty days ; and no bills or accounts should be left unpaid to be included in any subsequent report.

#### PURCHASES, BY WHOM MADE.

There has been a practice tolerated by some of the superintendents of allowing foremen, lock-tenders and others to make purchases on the credit of the State. All purchases should be made by the superintendent personally, or on his *written order*, and not otherwise. The superintendent is furnished with money to pay for everything which is required for the repair of the canals, and as soon as any work

for the State is done, it should be promptly paid for; and, at all events, the persons employed by the superintendents should not in any case be allowed to purchase articles for the canal on the credit of the State.

#### APPOINTMENTS OF SUBORDINATES.

Chapter 57 of the Laws of 1851, section 3, confers upon you the power to appoint subordinates, and I therefore insert herein such section at large:

"Each superintendent so appointed shall have power to appoint his own foreman, lock-tenders and other subordinate persons necessary to enable him to discharge his official duties, and the compensation to each shall not exceed the rate of compensation established by the Board of Canal Commissioners; but the Canal Commissioner in charge of any section of the canal in which any foreman, lock-tender or other subordinate person may be employed, or the Board of Canal Commissioners, shall have absolute power to remove any foreman, lock-tender or other subordinate for misconduct, incompetency or neglect of duty, provided such Canal Commissioner or the Board of Canal Commissioners making such removal shall specify the cause of such removal in writing and file the same in the office of the Auditor of the Canal Department within ten days from the date of such removal. In case of the removal of any such foreman, lock-tender or other subordinate, it shall be the duty of the Commissioner or the Board of Canal Commissioners making such removal immediately to notify the superintendent in charge of the section of the canal where such removal shall be made of the fact of such removal; and in case the superintendent shall neglect or refuse, for three days, to fill the vacancy thus created, and to notify the Commissioner or Board of Canal Commissioners thereof, it shall be the duty of the Canal Commissioner or the Board of Canal Commissioners making such removal to fill such vacancy."

#### LOCK-TENDERS.

In the employment of lock-tenders, you should employ such men only as will give their personal attention to the business, and under no pretense should a contract for tending locks be made with a person who intends to sub-let or farm it out; and if any person, after his appointment as a lock-tender, does not give it his personal attention, or sub-lets or farms it out in any manner, you are required forthwith to remove him, and appoint another who will properly attend to his duties.

The lock-tender has the power of determining as to the preference between boats in passing a lock; and he ought not only to be in attendance himself, but he should be a sober, honest and discreet man, who can be relied upon to decide these questions promptly and impartially.

Lock-tenders are prohibited, by a resolution of the Canal Board, from being concerned in any grocery on or near the canal. You are particularly required to see that this resolution is strictly complied with.

It is alleged that some of the lock-tenders on the canal have been in the habit of receiving presents of wood, etc., from boatmen; and it is inferred that those who receive such favors repay them by giving to such persons an undue preference at the lock. The lock-tender should in no case place himself in a position which will expose him to the suspicion, on the part of a boatman against whom he may decide, that his decision is influenced by any benefits conferred by the person in whose favor he may decide. The practice alluded to is as objectionable as it would be for a magistrate, on the trial of a suit between two neighbors, to receive a present from either of the parties; a right decision, under such circumstances, would not protect

the magistrate from the suspicion that his mind was biased by the favor conferred; at least this would be the opinion of the defeated party, under a feeling that his cause was a just one.

Every suit commenced by a lock-tender should be immediately reported to the superintendent; and all fines collected should be accounted for at the close of each month, and the particulars of each case should be entered in the books of the superintendent, and the moneys received should be accounted for in his first settlement after the transaction.

If any suit is to be carried to a higher court, the particulars of the case should be reported to the Auditor in the same manner as is required in relation to suits commenced by the superintendent himself.

As soon as the lock-tenders are appointed on your line, you are requested to send a list of their names to the Auditor, the number of the lock or locks in charge of each, the pay per month or the amount of the contract with each person. This will enable the Auditor to estimate how much you require per month for lock-tending, and when you require it, as payment can only be necessary monthly.

#### CONTRACTS.

All contracts for materials or jobs made by you should be in writing, and duly executed by the parties, and an account opened in each case on the books of the superintendent; no contract should be made or important improvement undertaken by you without the express approval and ratification of the Commissioner, and such approval or ratification of a contract should be signified by a certificate or indorsement on the contract. As soon as the contract is executed, notice should be given to the Auditor, stating the substance of the contract, the name of the contractor, and such particulars as will enable the Auditor to form an estimate of the amount of money required to complete the payments on the contract; the contract itself should be sent to the Auditor, with the voucher for the first payment under it. If other payments are to be made on the same contract, the superintendent can retain a copy of it for his use. The return alluded to will aid the Auditor in determining, when an advance is asked for, whether it is required to meet engagements made on behalf of the State.

You are prohibited by a resolution of the Canal Board from participating in any contract on the canals. This prohibition extends to all materials, tools or implements for the use of the canals, or any transaction by which you shall, directly or indirectly, be benefited by any of the money disbursed by you as superintendent. You cannot properly allow any contractor to take timber or materials from your land and receive a compensation therefor; and you should not do indirectly, through any relatives or friends, what you are not allowed to do directly by the law, the regulations and your instructions.

So far as you have it in your power, you should extend the same prohibition to your foremen, lock-tenders, and all other persons employed by you on the State work. You should make no contracts with those who are employed in the service of the State, by the month, or any fixed period, for the supply of materials in repairing the canal. Any bargain of this kind, on the part of a lock-tender or a foreman is entirely inconsistent with his previous contract, to give the State his whole service as such foreman, lock-tender or laborer.

The fact has been disclosed, on the trial of one superintendent, that persons who were paid almost constantly for serving the State, were at the same time used as the instruments in buying off bidders for a contract, and getting possession of a job

under a higher bid ; thus depredating upon the State instead of serving it faithfully as they were bound to do, while they were retained from month to month, if not from year to year, in its service.

All contracts for repairs or improvements, directed by the Legislature or the Canal Board, must be made in writing, and public notice must be given that sealed proposals will be received for entering into such contracts. The ordinary repairs of a canal may be made without a special contract. But in all cases where the execution of a job, not directed by the Legislature or the Canal Board, can as conveniently be done by contract as those improvements which are thus directed, the State should have the benefit of the competition provided for in the law.

It is considered that all work which is susceptible of measurement should be done by written contracts at specified prices. Sufficient public notice should be given for sealed proposals for all contracts, and in such manner as the Commissioner may from time to time direct.

#### ANNUAL REPORT OF PROPERTY IN CHARGE OF SUPERINTENDENTS.

You are required to make an annual report, giving a schedule of all the property belonging to the State on the line of canal under your charge. This will require you to keep a memorandum of every article purchased for the use of the State, and of all tools or implements which are worn out, broken or lost, in order that you may, on the first day of January, in each year, render a satisfactory account of the property on hand, compared with the previous schedule, and the purchases between the periods of making the two reports.

#### OLD MATERIALS, HOW DISPOSED OF AND ACCOUNTED FOR.

Whenever aqueducts or other structures are repaired, the utmost caution and strictness should be observed in relation to the old materials. These materials, of every description, if not necessary to be preserved for the use of the State, should be sold to the highest bidder, after giving reasonable public notice of the sale. The proceeds of such sale should be reported and accounted for at the close of the sixty days in which the sale is made. And you should, in thus reporting it, specify the time and place when such sale was made, and the notice that was given thereof. The superintendent should not himself be interested in any purchases of public property sold on the line of the canal.

Whenever paddle-gates, or any of the iron work connected with the locks, are replaced, the lock-tender should be held responsible for the safe keeping of the old article, which, if it cannot be repaired and used, should be disposed of by the superintendent for the benefit of the State, and accounted for by him.

#### SUITS FOR PENALTIES, ETC.

The superintendents, in a great variety of cases, are authorized to sue in the name of the people, for penalties for violations of the canal law and the regulations of the Canal Board. Where the superintendent is sued, or commences a suit before a justice, if the suit is to be carried to a higher court by either party, a full statement of the case should be made and sent to the Auditor, in order that the advice of the Attorney-General may be obtained before a heavy bill of costs has been made for the State to pay. Claims for costs, unless a sum sufficient for the purpose is recovered, cannot be paid until they are examined and allowed by the Commissioners of the Canal Fund, as required by law.

#### BREACHES.

Whenever there is a breach in the canal, you should immediately give notice of it

to the Auditor as well as the Commissioner. If money will be required to enable you to pay off the hands employed on the breach, you should state the facts in your notice to the Auditor. As soon as the breach is repaired, the Auditor should be informed of it, and of the expense incurred. This is desirable, as well on account of having authentic information in relation to the condition of the navigation as on account of the expenditure for the repair.

Timely examinations of the structures connected with the public works, and unremitting vigilance on the part of the superintendent and those employed under him, may, in almost every case, prevent breaches. Where they take place, and a heavy expense is incurred by the State, and the trade of the canals is interrupted, it is important that the superintendent and those under him should be enabled to show that the occurrence is not attributable to any neglect on their part.

Last season was one peculiarly unfortunate in regard to breaches, and it is believed that the most part, if not all of them, could have been avoided by proper care and attention on the part of the superintendents and their subordinates. With proper watching and regulation of the levels, breaches in the canal seldom, if ever, need occur; and you will be expected to use every means within your power to protect against them. The Canal Board, believing that they are generally more the result of negligence than unavoidable accident, have directed me to notify you that they will hold each superintendent to a rigid accountability for any breaches that may occur upon his section; and will act upon the principle that a superintendent who cannot, except under very extraordinary circumstances, protect the canal from breaches, is *incompetent* for the charge.

#### PUBLICATION OF MONTHLY ABSTRACT.

The law passed in March, 1853, being chapter 52 of the Laws of that year, which requires you to publish monthly abstracts of your disbursements, provides that "the expense of such publication shall not exceed the sum of fifteen dollars, to be regulated and fixed by the Auditor of the Canal Department." Taking the experience of former publications, I have concluded to fix the rate of compensation, applicable to all papers, at seventy-five cents for each sixteen lines of an ordinary newspaper column, which, for the Evening Journal and Argus, of this city, is called a square. Experience thus far shows that, at that rate of compensation, the expense of three-fourths of the publications would not average more than about nine dollars per month, while the average of the largest would scarcely exceed fifteen dollars per month.

It must, of course, be understood that you cannot pay more than fifteen dollars for a single month. If, at the rate fixed, it would amount to more than fifteen dollars, and no paper will publish it, then you are to file it as directed by the law.

Almost all the papers follow the form prescribed, and confine the publication to the width of a column. A few occupy the width of two columns. In such cases the pay will be for only one-half the space occupied, and at the rate mentioned.

#### NOT TO RETAIN MONEY BELONGING TO WORKMEN.

You should not retain in your hands the money belonging to the workmen, or any of them, although they may request you to do it for their use and benefit. If any of them desire to deposit their money with you for safe-keeping, you should decline receiving it; being the agent of the State, you cannot accept these trusts from those who work for the State without creating in their minds the belief that in this transaction, also, you are, in some degree, acting in your official capacity, and that the State ought to be responsible for your acts.

You have a high responsibility cast upon you, and the interests of the State, as

well as the interests of those who navigate the canals, are to be affected, favorably or unfavorably, by the manner in which you discharge your duties. You cannot do justice to the public, or to your own character, without being constantly on the line of the canal and devoting your whole energies to the public service.

Money is placed in your hands, to an immense amount, with the confident reliance that you will faithfully expend it in paying those who have furnished materials for the canal or rendered service to the State. Beyond the amount of your own salary, which you are allowed to receive every two months, you should not permit yourself to use a dollar of the public money for private purposes, under any pretense whatever.

#### CLERKS, ETC.

Such superintendents as are allowed clerks will appoint such clerks subject to removal by the Canal Commissioner, who will also determine the amount to be paid them for their services. \*

You will receive from your predecessor, the late superintendent of repairs, all books, blanks, papers and other property belonging to the State, which he may have in possession, rendering a receipt therefor, and send a copy of such receipt to this office.

#### PATROLMEN.

Act chapter 55 of the Laws of 1870 authorizes the Canal Board to appoint as many patrolmen as it may deem necessary to act as a police along the canal, and enforce the canal laws and regulations. Section six of said act further provides that "such patrolmen shall be assigned to such portions of the canals as the Commissioner shall direct, and shall be subject to and under the control of said Commissioner, and the officer in charge of the repairs of such portion of the canal."

The regulations in regard to patrolmen adopted by the Canal Board, June 16, 1870, provide, among other things, that "it shall be the duty of such patrolmen to pass over that portion of the canal assigned them daily, and oftener, if necessary, to see that the levels are kept at a proper and uniform height; that water is not unnecessarily wasted, or wrongfully taken from the canal; that timely warning is given to the repair agents of leaks or other dangers to the canal; that the locks are well and properly attended; that boats are not overloaded; that boatmen keep their boats moving, and in such shape at all times as not to in any way or manner obstruct the flow of water or navigation."

You are, therefore, required to exercise such supervision and "control" over the patrolmen that have been or may be regularly appointed and stationed upon your section of the canal, as will secure from them the faithful performance of their duty, and enable you to render to the Commissioner in charge a truthful account of the number of days each patrolmen has served the State during the preceding month.

You will carefully preserve all circulars, pamphlets and printed directions which you may, from time to time, receive from this office, and carefully place the same on file.

Yours, respectfully,

JAMES A. BELL, Auditor.



## FORM—(Continued).

Balance from last abstract due the State (or due me, as the case may be),	\$40 00
Deposited since that abstract my drafts on the Auditor of the Canal	
Department to my credit in the bank.....	2,920 00
	<u>\$2,960 00</u>
Expended as per abstract.....	2,624 93
	<u>\$335 07</u>
Balance.....	\$335 07
Of this balance there is in bank .....	\$300 00
Of this balance there is in hand .....	35 07
Total in bank and in hand, equal to balance above...	<u>\$335 07</u>

C. D., *Superintendent of Canal Repairs.*

Dated this 2d day of June, 1870.

STATE OF NEW YORK, } ss.:  
COUNTY OF

, superintendent of canal repairs, having charge of the line of canal specified in the above abstract, doth solemnly swear that the foregoing is a true abstract of all the vouchers, taken by him as such superintendent, for the days ending on the day of , 187 ; and doth further swear that the money specified in the several receipts, of which the above is an abstract (except those marked "A" on the back as having been paid by agents), has been actually paid as specified in said receipts, in cash or by check on the bank; and further, that all the receipts, not specially excepted, were each and every of them filled up as they now appear before they were signed; and he doth further swear that, according to the best of his knowledge and belief, all the labor has been performed, services rendered and materials furnished for the benefit of the State, and the State alone, and at as fair and reasonable prices as the same could be procured; and further swears that all fines, penalties and forfeitures collected, and the sales of public property made during the period aforesaid, on the line of canal under his charge, are, according to the best of his knowledge and belief, correctly entered on the said abstract.

C. D., *Superintendent.*Subscribed and sworn to before me this }  
day of , 187 . }A. B., *Canal Commissioner.*

[In the absence of the Canal Commissioner, the oath may be taken before any judge or commissioner.]

I certify that I have examined the preceding abstract, and the vouchers of which it is an abstract, amounting to dollars and cents; that the several disbursements specified therein were made under my direction on the canal or for repairs necessary to be made thereon, and that I believe such disbursements were proper and reasonable, and have been made as charged in the said abstract and vouchers.

[Signed]

A. B., *Canal Commissioner upon that part of the canal described in the heading of the above abstract.*

Dated 6th day of June, 1870.



## NOTES.

Vouchers and check rolls should be entered invariably in the order of the dates. Both sides of their sheet are to be written upon. No. 7 is to be equal to the footings of all the columns from No. 2 to No. 6, inclusive.

Should a voucher contain articles or matter that would come under two or more of the above heads, put the true amount under each head, and the total in the total column.

The column before the one headed "lock-tending" is intended for the entry of lock-tending and check rolls for a month, to get at the footing of each for that period, to be carried under the appropriate heads.

The above "form" is intended to show the superintendents how they are to fill up their abstracts to be sent to the Canal Department. It is expected that this "form" will be always used by every superintendent as a guide in making up their abstracts.

STATE OF NEW YORK, CANAL DEPARTMENT, }  
ALBANY, 187 . }

To.....:

SIR.—At a meeting of the Canal Board, held ——— 187 , you were appointed a patrolman, under act, chapter 55 of the Laws of 1870, to be assigned to duty on such portion of the canals as the Commissioner in charge of the ——— division may direct, at a salary of ——— dollars per month.

Within ten days after the receipt of this notice, you are required to take and subscribe the official oath required by the Constitution of this State, file the same in the office of the clerk of the county in which you reside, and transmit a certified copy thereof to this department.

On the opposite side of this sheet you will find a certified copy of the regulations adopted by the Canal Board, June 16, 1870, in regard to the duties of patrolman. I will also send you a certified copy of the canal laws and regulations.

Yours, etc.,

....., Auditor.

## REGULATIONS IN REGARD TO PATROLMEN.

The Commissioner in charge shall assign to each of the patrolmen appointed by the Canal Board such beat or portion of the canal on his division as he shall deem expedient. Such patrolmen shall take the oath of office prescribed by the Constitution of the State, within ten days after notice of appointment, and file the same in the office of the county clerk of the county in which he shall reside, and also in the office of the Auditor at Albany.

It shall be the duty of such patrolmen to pass over that portion of the canal assigned them daily, and oftener if necessary, to see that the levels are kept at a proper and uniform height; that water is not unnecessarily wasted or wrongfully taken from the canal; that timely warning is given to the repair agents of leaks or other dangers to the canal; that the locks are well and properly attended; that boats are not overloaded; that boatmen keep their boats moving, and in such shape at all times as not to in any way or manner obstruct the flow of water or navigation.

Every master or person in charge of a boat or float shall obey the orders of the patrolmen as to taking off a part of their cargo, if overloaded; as to keeping their boats or floats in such shape, at all times, as not to obstruct navigation or the flow of

water, and shall move their boats or floats, or moor them, as he shall direct, in order to facilitate navigation and promote the best interest of the State and navigator; but for any willful neglect of these things, or disobedience of the orders of patrolmen with reference thereto, such master or person in charge of a boat or float shall be liable to a fine of from five to ten dollars for each offense, dependent upon the nature of the same, which fine may be laid and collected by such patrolman, and the boat or float detained until such fine be paid. All fines so collected to be paid to the State.

Each patrolman, by virtue of act, chapter 55, of the Laws of 1870, has police powers and authority to arrest and detain offenders for any violation of the rules and regulations of the Canal Board, made and adopted pursuant to law, until the persons or parties so offending shall satisfy the demands of the same.

STATE OF NEW YORK, CANAL DEPARTMENT.

I certify, that I have compared the foregoing regulations with the original regulations, adopted by the Canal Board on the 16th day of June, 1870, and that the same is a true copy thereof, and of the whole of said original regulations.

In witness whereof I have hereunto set my hand and affixed my official seal, this 16th day of June, A. D., 1870.

....., Auditor.

..... 1870.

I hereby certify that , a patrolman, stationed at , on section of canal, has faithfully performed the duties prescribed by the regulations in regard to patrolmen, adopted by the Canal Board June 16, 1870; and rendered such other services on the canal as have been required of him and that he is justly entitled to pay for days' service in the month of , 1870.

.....Superintendent,

Section of canal.



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**TABLES**  
**OF THE PRINCIPAL PLACES ON THE CANALS, AND**  
**THEIR DISTANCE FROM EACH OTHER.**

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285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413	1414	1415	1416	1417	1418	1419	1420	1421	1422	1423	1424	1425	1426	1427	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## CHAMPLAIN CANAL.

NAMES OF PLACES.	DISTANCE FROM		
	Place to place.	Albany.	Whitehall.
Albany .....	0	0	73
West Troy .....	7	7	66
Junction .....	0	13	66
Waterford .....	0	13	61
Mechanicville .....	8	20	58
Stillwater village .....	4	24	49
Bleecker's Basin .....	2	26	47
Wilbur's Basin .....	2	28	45
Van Dusen's Landing .....	5	33	40
Schuylerville .....	3	36	37
Saratoga Bridge .....	2	38	36
Fort Miller .....	3	41	33
Moses Kill .....	3	44	29
Fort Edward .....	5	49	24
Glen's Falls feeder .....	3	51	23
Baker's Basin .....	1	53	21
Smith's Basin .....	5	57	16
Fort Ann .....	4	61	12
Comstock's Landing .....	4	65	8
Whitehall .....	8	73	0

GLEN'S FALLS FEEDER — (*Champlain Canal*).

NAMES OF PLACES.	Distance from place to place.
Champlain canal .....	0
Sandy Hill .....	2
Glen's Falls .....	3
Head of the feeder .....	2
Head of the pond .....	5
From Junction to Whitehall .....	64
Length of Glen's Falls feeder .....	12
Length of pond above Troy dam .....	3
Total .....	79

## CHENANGO CANAL.

NAMES OF PLACES.	DISTANCE FROM				
	Place to place.	Utica.	Hamilton.	Oxford.	Binghamton.
Utica .....	0	0	30	60	97
Road leading from New Hartford to Whitesboro' .....	3	3	27	57	94
Clinton .....	6	9	21	51	88
Deansville .....	5	14	16	46	83
Oriskany Falls .....	5	19	11	41	78
Solsville .....	3	22	8	38	75
Bouckville .....	2	24	6	36	73
Peck's Basin .....	2	26	4	34	71
Hamilton .....	4	30	0	30	67
Lebanon Factory .....	2	32	2	32	65
Earlville .....	4	36	6	34	61
Sherburne .....	5	41	11	19	56
North Norwich .....	4	45	15	15	52
Plasterville .....	2	47	17	13	50
Norwich .....	4	51	21	9	46
Oxford .....	9	60	30	0	37
Haynes's Mill .....	10	70	40	10	27
Greene .....	4	74	44	12	23
Forks .....	8	82	52	22	15
Pond Brook .....	2	84	54	24	13
Port Crane .....	5	89	59	29	8
Crocker's Mills .....	1	90	60	30	7
Binghamton .....	7	97	67	37	0



## OSWEGO CANAL.

NAMES OF PLACES,	DISTANCE FROM		
	Place to place.	Syracuse.	Oswego.
Syracuse .....	0	0	38
Salina .....	2	2	36
Liverpool .....	3	5	33
Mud Lock .....	2	7	31
Cold Spring .....	1	8	30
New Bridge .....	5	13	25
Three River Point .....	2	15	23
Phoenix .....	2	17	21
Sweet's Lock .....	3	20	18
Ox Creek .....	2	23	15
Fulton .....	4	27	11
Braddock's Rapid .....	4	31	7
Tiffany's Landing .....	4	35	3
High Dam .....	1	36	2
Oswego .....	2	38	0

## CAYUGA AND SENECA CANAL.

NAMES OF PLACES.	DISTANCE FROM		
	Place to place.	Montezuma.	Geneva.
Montezuma .....	0	0	21
Seneca River .....	5	5	16
S. Dermont .....	2	7	14
Seneca Falls .....	3	10	11
Chamberlain's Mills .....	2	12	9
Waterloo .....	2	14	7
Teal's .....	5	19	2
Geneva .....	2	21	0
Lateral canal to E. Cayuga village, 3 miles .....	2		

## CHEMUNG CANAL.

NAMES OF PLACES.	DISTANCE FROM			
	Place to place.	Seneca Lake.	Elmira.	Knoxville.
Seneca Lake .....	0	0	23	33
Havana .....	4	4	19	29
Millport .....	6	10	13	23
Horseheads .....	7	17	6	16
Elmira .....	6	23	0	23
Knoxville .....	23	33	23	0
FEEDER. ( <i>Chemung Canal</i> )				
Horseheads .....	0	17	6	16
Miller's Basin .....	7	24	13	9
Dam at Head of Feeder .....	7	31	20	2
Knoxville .....	2	33	23	0

## CROOKED LAKE CANAL.

NAMES OF PLACES.	DISTANCE FROM		
	Place to place.	Seneca Lake.	Crooked Lake.
Dresden .....	0	0	8
Mallory's .....	0	3	5
Andrews and Ways .....	2	5	3
Penn Yan .....	2	7	1
Crooked Lake .....	1	8	0

## GENESEE VALLEY CANAL.

NAMES OF PLACES.	Distance from place to place.	DISTANCES FROM.								
		Rochester.	Scottsville.	Mount Morris.	Nunda.	Portageville.	Oramel.	Cuba.	Olean.	Dansville.
Rochester .....	0	0	12	37	51	59	78	93	107	52
Rapids (Lock No. 1) .....	2	2	10	35	49	57	76	91	105	50
Tone's Basin .....	6	8	4	29	43	51	70	85	99	44
Scottsville .....	4	12	0	25	39	47	66	81	95	40
Canawaugus (Avon Road) .....	8	20	8	17	31	39	58	73	87	32
Sackett's Basin .....	2	22	10	15	29	37	56	71	85	30
Fowlerville Road .....	2	24	12	13	27	35	54	69	83	28
Barclay's Mill .....	2	26	14	11	25	33	52	67	81	26
Tiffardina .....	3	29	17	8	22	30	49	64	78	23
Spencer's Basin .....	1	30	18	7	21	29	48	63	77	22
Tracy's Basin .....	2	32	20	5	19	27	46	61	75	20
Cuylerville .....	1	33	21	4	18	26	45	60	74	19
Leicester (Moscow Landing) .....	1	34	22	3	17	25	44	59	73	18
Genesee River Dam .....	2	36	24	1	15	23	42	57	71	16
Mount Morris .....	1	37	25	0	14	22	41	56	70	15
Shaker Settlement .....	4	41	29	4	10	18	37	52	66	11
Brushville .....	5	46	34	9	5	13	32	47	61	16
Nunda .....	5	51	39	14	0	8	27	42	56	21
Messenger's Hollow .....	2	53	41	16	2	6	25	40	54	23
Genesee Falls (Tunnel Section) .....	4	57	45	20	6	2	21	36	50	27
Portageville .....	2	59	47	22	8	0	19	34	48	29
Lock No. 61 .....	5	64	52	27	13	5	14	29	43	34
Mixville Landing (Wiscon Feeder) .....	1	65	53	28	14	6	13	28	42	35
Fillmore .....	4	69	57	32	18	10	9	24	38	39
Burrville .....	6	75	63	38	24	16	3	18	32	45
Canadea Centre .....	1	76	64	39	25	17	2	17	31	46
Oramel .....	2	78	66	41	27	19	0	15	29	48
Belfast .....	2	80	68	43	29	21	2	13	27	50
Rockville .....	3	83	71	46	32	24	5	10	24	53
Caseville .....	1	84	72	47	33	25	6	9	23	54
Black Creek Corners .....	4	88	76	51	37	29	10	5	19	58
Cuba .....	5	93	81	56	42	34	15	0	14	63
Iechua Feeder .....	6	99	87	62	48	40	21	6	8	69
Hinsdale .....	1	100	88	63	49	41	22	7	7	70
Olean .....	7	107	95	70	56	48	29	14	0	77
DANSVILLE BRANCH.										
Shaker Settlement .....	0	41	29	4	10	18	37	52	66	11
Fitzhugh's Basin .....	2	43	31	6	12	20	39	54	68	9
Kyserville .....	1	44	32	7	13	21	40	55	69	8
Rock Spring .....	2	46	34	9	15	23	42	57	71	6
Sherwood's Landing .....	1	47	35	10	16	24	43	58	72	5
Steam Saw Mill .....	1	48	36	11	17	25	44	59	73	4
McNair's Landing .....	1	49	37	12	18	26	45	60	74	3
Woodville .....	1	50	38	13	19	27	46	61	75	2
Cummins ville .....	1	51	39	14	20	28	47	62	76	1
Dansville .....	1	52	40	15	21	29	48	63	77	0

## DANSVILLE SIDE CUT—(Genesee Valley Canal).

NAMES OF PLACES.	Distance from place to place.
Shaker Settlement (Junction) .....	0
Fitzhugh's Basin .....	2
Kyserville .....	1
Rock Spring .....	2
Sherwood's Landing .....	1
Steam Saw Mill .....	1
McNair's Landing .....	1
Woodville .....	1
Cummins ville .....	1
Dansville .....	1

## ONEIDA LAKE CANAL AND FEEDER.

Extends from the Erie Canal at Higgins, four miles west of New London, to the Oneida Lake, as follows:

Canal proper, from Higgins to Wood Creek .....  $3\frac{1}{2}$  miles.  
 Wood Creek, with a towing path to the Oneida Lake ...  $2\frac{1}{2}$  miles.

## BLACK RIVER CANAL.

NAMES OF PLACES.	DISTANCE FROM		
	Place to place.	Rome.	Booneville.
Rome .....	0	0	25
Ridge Mills.....	2	2	23
Lock No. 7.....	3	5	20
Walworth's Store House.....	1	6	19
Westernville.....	3	9	16
Wells Brook Aqueduct.....	2	11	14
Stringer's Creek.....	2	13	12
Lansing Kill.....	1	14	11
Lock No. 81.....	2	16	9
Lansing Kill Dam or Feeder.....	1	17	8
Lower Falls Lansing Kill.....	2	19	6
Upper Falls Lansing Kill.....	2	21	4
Lock No. 70.....	2	23	2
Booneville.....	2	25	0
Sugar River.....	3	28	3
Little Falls, Black River.....	1	29	4
Port Leyden.....	3	32	7
Lock No. 97.....	1	33	8
Lyon's Falls.....	2	35	10
Hawkinsville, on Feeder (8 miles from Booneville).	..	28	2
A. Lee's, on Feeder.....	2	30	5
R. B. Miller's, on Feeder.....	1	31	6
State Dam, on Feeder.....	4	35	10
Head of Reservoir.....	2	37	12

## ONEIDA RIVER IMPROVEMENT CANAL.

NAMES OF PLACES.	Distance from place to place.
Three River Point.....	0
Peter Scott Creek.....	4
Oak Orchard.....	4
Caughdenoy.....	7
Brewerton.....	5

## GENERAL SUMMARY.

Erie Canal .....	359	
Albany Basin .....	1	
Feeders .....	8	361 miles.
Champlain Canal.....	66	
Glen's Falls Feeder.....	12	
Pond above Troy Dam .....	8	81 miles.
Chenango Canal.....	95	97 miles.
Black River Canal.....	35	
Feeder and Reservoir .....	12	
River Improvement.....	49	80 miles.
Oneida Lake Canal and Feeder.....	7	7 miles.
Oswego Canal.....	38	
Baldwinsville Side Cut.....	1	
Oneida River Improvement .....	20	
Seneca River Towing Path .....	5 $\frac{1}{2}$	
Seneca River Improvement .....	12 $\frac{1}{2}$	77 miles.
Cayuga and Seneca Canal.....	23	23 miles.
Crooked Lake Canal .....	8	8 miles.
Chemung Canal .....	22	
Feeder .....	16	
Genesee Valley Canal.....	107	30 miles.
Dansville Side Cut .....	11	
Total .....	900	900 miles.

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# STATE OF NEW YORK.

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No. 30.

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## IN ASSEMBLY,

January 27, 1872.

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### LIST OF GENERAL ORDERS.

G. O.

74. An act to incorporate the Manhattan Accommodation Company.
75. An act to authorize the city of Buffalo to raise money to extend the supply of water to the city and its inhabitants, and for that purpose to issue its bonds.
76. An act to provide for the speedy construction of sewers in a certain portion of the city of Brooklyn.
77. An act in relation to the location and erection of public buildings for the use of the city of Rochester.
78. An act to amend an act entitled "An act to amend an act entitled 'An act to provide for a supply of water in the city of Poughkeepsie, and for sewers therein,'" passed April 12, 1867; passed April 9, 1870, and to amend section 1 of chapter 594 of the Laws of 1871.
79. An act concerning the responsibility of certain city and county officers of the city and county of New York.
80. An act to amend an act entitled "An act to incorporate the village of Port Richmond," passed April 24, 1866.
81. An act to amend an act entitled "An act to amend the several acts incorporating the village of Weedsport, in the county of Cayuga," passed April 7th, 1857.

